



PERMANENT MISSION OF
THE REPUBLIC OF INDONESIA TO
THE UNITED NATIONS, THE WTO
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IN GENEVA

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The Permanent Mission of the Republic of Indonesia to the United Nations, WTO and other International Organizations in Geneva presents its compliments to the Secretariat of the Stockholm Convention on Persistent Organic Pollutants and has the honour to transmit herewith the Government of Indonesia's National Implementation Plan to the Stockholm Convention, pursuant to Article 7 of the Convention.

The Permanent Mission of the Republic of Indonesia to the United Nations, WTO and other International Organizations in Geneva avails itself of this opportunity to renew to the Secretariat of Stockholm Convention on Persistent Organic Pollutants the assurances of its highest consideration.

Geneva, 18 November 2021



Secretariat of the Stockholm Convention on Persistent Organic Pollutants

11-13, Chemin des Anémones – 1219 Chatelaine
brs@un.org, contacts@brsmeas.org



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

REPUBLIC OF INDONESIA

2021



**MINISTER OF ENVIRONMENT AND FORESTRY
THE REPUBLIC OF INDONESIA**

PREFACE

I welcome the publication of Indonesia's National Implementation Plan to the Stockholm Convention on Persistent Organic Pollutants (POPS). As you are aware, this Convention is a global treaty to protect humans, wildlife, and the environment from chemicals that remain intact in the environment for long periods causing harm.

The Stockholm Convention has enabled countries of varying needs and capabilities to collectively reduce and restrict persistent organic pollutants. And I believe that this Convention can inspire similarly productive negotiations in other environmental issues.

The Government of Indonesia has ratified the Convention through Law 19 Year 2009. Pursuant to Article 7 of the Convention, a state party is mandated to implement actions plans through a constantly evolving National Implementation Plan.

The document you are reading is a review and update to Indonesia's 2014 National Implementation Plan. An integrated workplan consisting of policy, strategy, and action plans, Indonesia's National Implementation Plan serves a key guiding role for all stakeholders when overcoming the serious problems caused by persistent organic pollutants.

The 2014 plan focused on implementation evaluation, data inventory, and identification review with updates from the latest Conference of the Parties. The 2020 plan focuses on the management aspect for persistent organic pollutants through the identifications of status, data sources, resources, and activities.

The 2020 National Implementation Plan would not be complete without the continuous support and cooperation from all stakeholders: government, private sectors, academia, and public. I thank the contributors, experts, ministries/agencies, and related stakeholders that contributed to the completion of this plan.

We now have a solid plan. Now comes the hard part and the reason why we serve in government. The citizens, wildlife, and environment – both marine and terrestrial – sustaining life throughout this majestic republic expect a healthy and sustainable environment. Now it is up to us to deliver real results. Therefore, we have to work hand-in-hand to ensure that the plan can be translated into reality.

Jakarta, August 2021

Minister of Environment and Forestry
Republic of Indonesia

A handwritten signature in black ink, appearing to be 'Siti Nurbaya', written over a horizontal line.

Siti Nurbaya

EXECUTIVE SUMMARY

In relation to POPs management in Indonesia, whole life-cycle of some POPs have been included in laws and regulations, such as: use, import, releases, waste containing POPs, and recovery of POPs contaminated site. However, it has not cover all types of POPs listed in the Stockholm Convention. Recently, amendment to Government Regulation Number 74 of 2001 on Hazardous Substances Management is on process. The amendment will cover the updated scope of POPs provisions in the Stockholm Convention. POPs monitoring has been included in many regulations, but yet not cover all types of POPs. This document covers POPs targetted in NIP POPs 2014; COP 5 amendment, Endosulfan; COP 6 amendment, Hexabromocyclododecane; COP 7 amendment, Chlorinated naphthalenes, Hexachlorobutadiene, Pentachlorophenol; COP 8 amendment, Decabromodiphenyl ether, Short-chained chlorinated paraffins; and COP 9 amendment, Perfluorooctanoic acid and dicofol.

POPs status in Indonesia

In general, data on stockpiles and contaminated site of POPs in Indonesia are still limited. Although POPs-Pesticides have been banned from being used as pesticides, imports of some POPs-Pesticides are still being found. Based on inventory data, there are no production and export found on POP-Pesticides, either the initial POPs or new POP-Pesticides. Inventory result also reveal that there are no import of initial POPs recently. However, new POP-Pesticides such as Chlordane, Endosulfan, Lindane, Pentachlorophenol, and Dicofol are still imported. Thus, it is possible to find an unknown amount of stockpile in the field. Further inventory is needed to assess the amount of the remaining POP-Pesticides stockpile.

PCBs inventory in transformers oil samples have been conducted in 2015-2016 at 6 provinces which collecting 3,015 samples from 1,033 companies in Java Island. From the inventory result, it is known that 134 ton of transformers oil and 400 ton of equipment were contaminated (PCBs > 50 ppm). Further inventory conducted in 2019-2020 with samples of online transformers (currently being used) in industries located in Java and Sumatera island and 1,500 samples of transformers (consist of online and offline transformers) owned by State Electricity Company. Other inventory related to waste oil containing PCBs imported to

Indonesia was recorded lastly in January 2016. Meanwhile, import of article containing PCBs was recorded lastly in July 2016. Production and export of PCBs were not found in Indonesia.

Inventory of penta-BDE and octa-BDE have been conducted in 2013. Inventory result showed that production, export, import, and commercial use data of penta-BDE and octa-BDE in Indonesia are not available. Neither did the information on stockpile. Up to 2020, inventory on POP-BDEs, HBB, and HBCDs have not conducted yet.

In agriculture sector, HCBd recently not listed as active ingredients and additives determine as prohibited or restricted pesticides. No import data found for HCBd. HCBd potentially contain in fertilizers products, chemicals, and imported processed-rubber. While for production, there was no data found for production and export of HCBd in Indonesia.

Specific arrangement of PCNs has not been included in laws and regulations of Indonesia, however naphthalenes and its derivatives have been included in the regulation of hazardous waste management. No production data of PCNs found in Indonesia. The Indonesian Customs Tariff Codes has not define a specific HS Code for PCNs, thus difficult to identify the export and import amount of PCNs.

Specific arrangement of SCCP has not been included in laws and regulations of Indonesia. Inventory of production source, emission or release of SCCP in Indonesia were never conducted during 2015-2020, except for product inventory containing CP in general. The amount of SCCP exported and imported were also not inventoried yet. There were only imported CP data during 2014-2016 with total import amount of around 13,521.07 ton, originated from China, India, Japan, Singapore, South Africa, Taiwan, and Thailand.

Based on BPS-Statistics Indonesia data of 2017, total amount of PCP imported during 2009-2017 was 537,052 kg and total export was 32,243 kg. Up to now, inventory of production source, emission, release of PCP, and PCP-containing product in Indonesia were not conducted yet. Likewise, since 2015 there has been no study of PCP substitution alternatives in Indonesia. No record found on stockpile, contaminated site, and contaminated waste of PCP from 2015 to 2020.

Use of DDT has been banned in Indonesia. Inventory result showed that no import data of DDT ever since. Even if DDT has not used in Indonesia for a long period, residue of DDT in ricefield

soil, river water, and shallots are still detected based on Indonesian National Standard Number SNI 7313:2008 on DDT Parameters. No record found on DDT stockpile.

In 2014, potential amount of PFOS, its salts, and PFOSF in Indonesia estimated based on article or product assume to contain PFOS and PFOS-related. Estimation was made of export and import statistics in several sectors such as: pulp and paper; fire-extinguishing foam; textile; and synthetic carpets. Ever since, inventory of PFOS, its salts, and PFOSF were not conducted yet.

Inventory for unintentional POPs (UPOPs) releases were conducted lastly in 2013-2014. Total releases of dioxins and furans were estimated about 9,881 g toxic equivalent (TEQ). The first rank of source of the release is open burning (5,547.2 g TEQ). Release of unintentionally produced PCBs was estimated about 4.32 kg TEQ with the highest from heavy-oil burning (4.31 kg TEQ) due to its relatively high emission factor. Release of unintentionally produced HCB was estimated about 1.91 ton per year. Lack of data and infrastructure to analyse dioxins and furans at national level have been causing less measurement data collected. Last inventory data were collected from big industries that financially capable to measure releases of dioxins/furans and several data of releases source that not integrated to the system.

POPs monitoring and its impact to environment have been carried out and reported to be detected in various environmental media as well as biota. However, POPs monitoring are still limited and not covered all types of POPs, especially monitoring of POPs impact to human health.

NIP POPs 2014 achievement

In general, part of NIP POPs 2014 action plans have been completed. Based on the evaluation of NIP POPs 2014, there are several actions have been determined but not yet achieved. The factor that needs to be considered in achieving NIP POPs action plan is necessity to improve coordination between ministries/agencies to be more effective and efficient.

Strategy and action plans of the National Implementation Plan

The action plan for implementing the Stockholm Convention is determined by taking into account the priority of activities. The priority is determined based on the implementation status of NIP POPs in 2014, POPs data inventory, and current policies. The action plan for implementing the Stockholm Convention covers:

- a. regulations strengthening;
- b. institutional strengthening and capacity building;
- c. measures to reduce or eliminate releases from intentional production and use;
- d. register of specific exemptions or acceptable purposes;
- e. measures to reduce releases from unintentional production;
- f. identification of stockpiles, articles in use and waste;
- g. stockpiles management and appropriate measures for handling and disposal of articles in use
- h. identification of contaminated sites (Annex A, B, and C of Chemicals) and environmentally sound remediation;
- i. information exchange and stakeholders involvement;
- j. public awareness, information, and education;
- k. reporting;
- l. research, development and monitoring; and
- m. technical and financial assistance.

Implementation of NIP POPs will be realized in 2 years period by involving related stakeholders.

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ABBREVIATION AND ACRONYM

B3	Bahan berbahaya dan beracun/Hazardous substances
Balangan	Balai Penelitian Lingkungan Pertanian/The Agricultural Environment Research Institute
Bappenas/ Kementerian PPN	Badan Perencanaan Pembangunan Nasional/National Development Planning Agency, Ministry of National Development Planning
BAT/BEP	Best Available Technique/Best Environmental Practises
BCRC	Basel Convention Regional Centre
BCRC-SEA	Basel Convention Regional Centre for South-East Asia
BMKG	Badan Meteorologi Klimatologi dan Geofisika/ Meteorological, Climatological and Geophysical Agency
BPOM	Badan Pengawas Obat dan Makanan/ National Agency of Drug and Food Control
BPPT	Badan Pengkajian dan Penerapan Teknologi/ Agency for the Assessment and Application of Technology
BPS	Badan Pusat Statistik/Statistics Indonesia, Central Bureau of Statistics
BSN	Badan Standarisasi Nasional/National Standardization Agency
CAS	Chemical Abstracts Service
CIF	Cost, insurance, freight
COP	Conference of the Parties
CP	Chlorinated Paraffins
CRT	Cathode ray tube
DDD	Dichloro diphenyl dichloroethane
DDE	Dichloro dichlorodiphenyl ethylene
DDT	1,1,1-trichloro-2,2-bis(4-chlorophenyl)ethane
DIY	Daerah Istimewa Yogyakarta/The Special Region of Yogyakarta
DKI Jakarta	Daerah Khusus Ibukota Jakarta/Special Capital District of Jakarta
DPR	Dewan Perwakilan Rakyat/House of Representatives
DRE	Destruction and removal efficiency

ESM	Environmentally sound management
FAO	Food and Agriculture Organization
FOB	Free on board
FTIR	Fourier-transform Infrared Spectroscopy
GCMS	Gas Chromatography Mass Spectrometry
GEF	Global Environment Facility
GMP	Global Monitoring Plan
HBB	Hexabromobiphenyl
HBCD	Hexabromocyclododecane
HCB	Hexachlorobenzene
HCBD	Hexachlorobutadiene
HCH	Hexachlorocyclohexane
HS	Harmonized System
IPM	Integrated pest management
IEC	International Electrotechnical Commission
IVM	Integrated vector management
KADIN	Kamar Dagang Indonesia/ Indonesian Chamber of Commerce
KAN	Komite Akreditasi Nasional/National Accreditation Committee
Kemenakertrans	Kementerian Tenaga Kerja dan Transmigrasi/ Ministry of Manpower and Transmigration (MoMT)
Kemenaker	Kementerian Tenaga Kerja/Ministry of Manpower (MoM)
Kemendag	Kementerian Perdagangan/Ministry of Trade (MoT)
Kemendagri	Kementerian Dalam Negeri/Ministry of Home Affairs (MoHA)
Kemendikbud	Kementerian Pendidikan dan Kebudayaan/ Ministry of Education and Culture (MoEC)
Kemenhub	Kementerian Perhubungan/Ministry of Transportation (MoTransp)
Kemenhut	Kementerian Kehutanan/Ministry of Forestry (MoFor)
Kemenkum HAM	Kementerian Hukum dan Hak Asasi Manusia/ Ministry of Laws and Human Rights (MoLHR)

Kemenkeu	Kementerian Keuangan/Ministry of Finance (MoF)
Kemenkes	Kementerian Kesehatan/Ministry of Health (MoH)
Kemenlu	Kementerian Luar Negeri/Ministry of Foreign Affairs (MoFA)
Kemenperin	Kementerian Perindustrian/Ministry of Industry (Mol)
Kemenristek/BRIN	Kementerian Riset dan Teknologi/Badan Riset dan Inovasi Nasional/Ministry of Research and Technology/National Research and Innovation Agency (MoRT/NRIA)
Kementan	Kementerian Pertanian/Ministry of Agriculture (MoA)
KemSetneg	Kementerian Sekretariat Negara/Ministry of State Secretariat
KESDM	Kementerian Energi dan Sumber Daya Mineral/ Ministry of Energy and Mineral Resources (MoEMR)
KKP	Kementerian Kelautan dan Perikanan/Ministry of Marine and Fisheries (MoMF)
KLH	Kementerian Lingkungan Hidup/Ministry of Environment (MoE)
KLHK	Kementerian Lingkungan Hidup dan Kehutanan/ Ministry of Environment and Forestry (MoEF)
LB3	Limbah bahan berbahaya dan beracun/Hazardous waste
LD50	Lethal dose fifty
LIPI	Lembaga Ilmu Pengetahuan Indonesia/The Indonesian Institute of Sciences
LOD	Limit of Detection
LOQ	Limit of Quantitation
LSM	lembaga swadaya masyarakat/Non-governmental organization
MCCP	Medium Chain Chlorinated Paraffins
NAB	Nilai ambang batas/Threshold value
NGO	Non-governmental organization
NIES	National Institute for Environmental Science
NIP	National implementation plans
NTB	Nilai tambah bruto/Gross added value
OCs	Organochlorine

P3KLL	Pusat Penelitian dan Pengembangan Laboratorium Lingkungan/Center for Environmental Laboratory Research and Development
PAS	Passive air sampler
PBB	Polybrominated biphenyl
PBDEs	Polybrominated diphenyl ethers
PCBs	Polychlorinated biphenyls
PCDDs	Polychlorinated dibenzo-p-dioxins
PCDFs	Polychlorinated dibenzofurans
PCDDs/Fs	Polychlorinated dibenzo-p-dioxins/ polychlorinated dibenzofurans
PCN	Polychlorinated naphtalene
PCP	Pentachlorophenol
PCT	Polychlorinated terphenyl
PDB	Produk domestik bruto/Gross domestic product
PE	Polyethylene
PeCB	Pentachlorobenzene
Pemda	Pemerintah daerah/Local government
Pemkab	Pemerintah kabupaten/District government
Pemkot	Pemerintah kota/City Government
Pemprov	Pemerintah provinsi/Provincial government
Permen	Peraturan Menteri/Ministerial Regulation
Permentan	Peraturan Menteri Pertanian/Ministerial Regulation of Agriculture
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctane sulfonate
PFOSF	Perfluorooctane sulfonyl fluoride
PLHKI	Pekan Lingkungan Hidup dan Kehutanan Indonesia/ Indonesia Environment and Forestry Week
PLN	Perusahaan Listrik Negara/State Electricity Company
PLTSa	Pembangkit listrik tenaga sampah/Incinerator for Solid Waste-to-Energy Power Plant

PLTU	Pembangkit listrik tenaga uap Electric steam power plant
POPs	Persistent organic pollutants
POPsEA	Persistent Organic Pollutants in East Asian Countries
PP	Peraturan Pemerintah/Government Regulation
Pusarpedal	Pusat Sarana Pengendalian Dampak Lingkungan/ Center for environmental impact control facilities
Puslitbang	Pusat penelitian dan pengembangan/ Research and Development Center
PVC	Polyvinyl Chloride
RPN	Rencana Penerapan Nasional/National Implementation Plan
RPP	Rancangan Peraturan Pemerintah/ Draft of Government Regulation
SCRC	Stockholm Convention Regional Centre
SCCP	Short-chain chlorinated paraffins
SDM	Sumber daya manusia/Human Resources
Setkab	Sekretariat Kabinet/Cabinet Secretary
SIP	Sistem Informasi Pestisida/Pesticide Information System
SIPOPs	Sistem informasi POPs/POPs information system
SNI	Standar Nasional Indonesia/Indonesian National Standard
TCLP	Toxicity characteristic leaching procedure
TEQ	Toxic equivalent
TPA	Tempat Pemrosesan Akhir/Final Disposal Site
TVRI	Televisi Republik Indonesia/Television of the Republic of Indonesia
TWA	Time Weighted Average
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organization
UPOPs	Unintentionally produced POPs
US-EPA	United States-Environmental Protection Agency

UU	Undang-undang/Law
WEEE	Waste Electrical and Electronic Equipment
WHO	World Health Organization
XLPE	Crosslinking Polyethylene

I. INTRODUCTION

1.1. Background

Persistent Organic Pollutants (POPs) are organic chemical substances that are toxic, persistent, bio-accumulative, and become widely distributed geographically. POPs are substances that have relatively very-low polarity, causing it to easily accumulate in fatty tissue of humans and wildlife, also have harmful impacts on human health or on the environment.

The impacts of POPs exposure on human health such as cancers, birth defects, dysfunctional immune and reproductive systems, greater susceptibility to disease, and damages of central and peripheral nervous systems. Given their long range transport, no one government acting alone can protect its citizens and its environment from POPs.

Each country has different needs and abilities to control POPs exposure, the Stockholm Convention brings countries together to take global effort to reduce and restrict use of POPs. The Stockholm Convention require each party to:

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

Parties to the Stockholm Convention are required to prepare a plan explaining how they are going to implement the obligations under the Convention and make efforts to put such a plan into operation (Article 7), this so-called National Implementation Plan (NIP). This document composed of action plans to fulfill each arrangements and obligations under the Convention. Ever since the entry into force of the Convention, there has been several amendments, both in terms of obligations and in the Annexes. Indonesia conditions also change significantly, especially related to its national priorities. The changing of scope of problem faced in POPs

management has urged Government of Indonesia to review and update NIP POPs 2014. The review and update aimed to re-setting measures taken to manage POPs in order to accomplish environmentally sound management of POPs and fulfill any new amendments to the Convention adopted until its Sixth meeting of the Conference of the Parties (COP-6) in 2013.

Until its Ninth meeting of the Conference of the Parties (COP-9) in 2019, Stockholm Convention has listed 30 (thirty) types of POPs. Some of them are not included yet in the review and update of NIP POPs 2014. As a Party, Indonesia is required to review and update NIP POPs 2014, in order to include all new amendments and newly listed POPs.

1.2. Objectives and Benefits

This document is a review and update to NIP POPs 2014 in which elaborate the evaluation of existing implementation, identification review and data inventory, and the newest update from the Conference of the Parties to the Stockholm Convention (COP). Review and update for NIP POPs 2020 is focused on the identifications of status, data sources, resources, and activities related to POPs management for both initial POPs and New POPs . Further activities such as initial assessment, preliminary inventory, or in-depth inventory, will be the part of next action plans. The objectives of NIP POPs 2020 development are as follows:

- a. update POPs management status in Indonesia;
- b. map the needs, priorities, and resources available to implement the obligations under the Convention;
- c. plan activities in order to fulfill the obligations under the Convention.

NIP POPs 2020 comprise national action plans which can be use as:

- a. core planning of country development policies;
- b. guideline for ministries/agencies in planning activities and budget of POPs management based on their authority;
- c. basic considerations for strengthening infrastructure and resources to implement the Convention; and
- d. reference for related stakeholders to carry out activities on POPs management.

II. EXISTING CONDITIONS

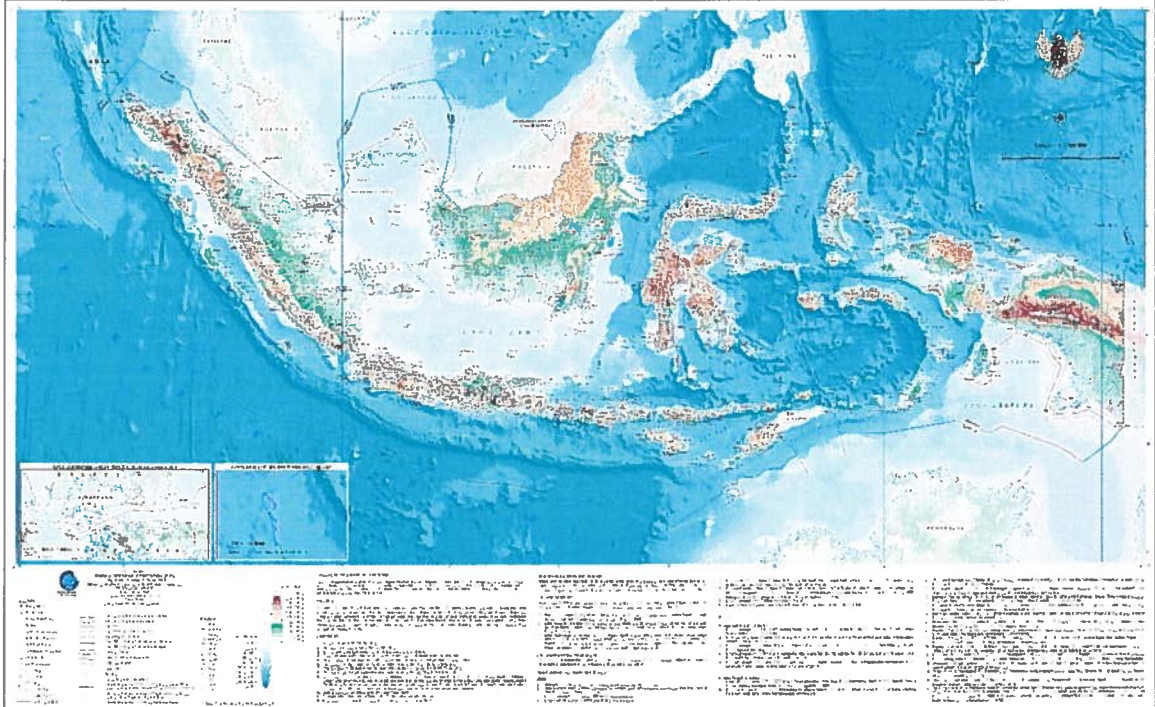


Image 2.1 Map of Indonesia, scale 1 : 5.000.000¹

2.1. Country Profile

Indonesia is the biggest archipelagic country in South East Asia, situated along the equator. Indonesian territory has been known for its high level of biodiversity. Not to mentioned the richness of natural resources, such as crude oil, tin, natural gases, nickel, timber, bauxite, fertile land, coal, gold, and silver. Further details of country profile are explained in the following sub-chapter.

2.1.1. Geography and Demographics

Geographic situation: Indonesia lies between 6° 04' 30" north and 11° 00' 36" south latitudes, and 94° 58' 21" east and 141° 01' 10" west longitudes. Indonesia is the world's largest archipelagic country. It has 16,056 islands along the equator. Indonesia situated between two

¹ Badan Informasi Geospasial
https://www.big.go.id/assets/download/2017/NKRI-2017/Peta_NKRI_Skala_5000000_03102017.jpg diakses pada Desember 2020

oceans, Hindia Ocean and Pacific Ocean, and also between two continents, Asia and Australia. These strategic position has influence the culture, politics, and economy of Indonesia.

Land territory: Indonesia is a maritime country with a long coastline of 108,000 km. The total area is approximately 8,300 million km², consist of land area of 1,900 million km² and waters covering 6,400 million km².¹

Climate: Indonesia has tropical climate, hot, humid, and tends to be more cold at highland area. Indonesia has two seasons, a dry and wet season. The dry season falls between June and September, while wet season between December and March. Temperature diversity are affected by altitude. In 2019, the lowest, average, and highest temperature are 18.2 degC, 26.31 degC and 36.10 degC consecutively. Humidity level is quite high, in range of 61.3%-96.3%. Precipitation trends are in range of 637.6 mm to 4,072.7 mm each year.

Administrative divisions: Since 2015, Indonesia divided into 34 province consist of approximately 415 regencies, 98 cities, 7,230 sub-regencies, and 74,953 villages.

Demographic distribution²: In 2019, Indonesia's population is 268,074.6 millions. The growth rate are decreased from 1.49% for 2000-2010 to 1.31% for 2010-2019. Almost 58% of the population lives in Java island, while Sumatera island is second most-dense island with population of 21%.

Age and gender distribution¹: The country currently possesses a relatively young population with 26.34% of the population aged between 0-14 years. In 2019, the population ratio based on gender is 99.4 (number of men in every 100 women). Due to this condition, Indonesia could be benefitted with demographic bonus by having high number of productive age in the next 20 years.

¹ Kelautan Dalam Angka, KKP, 2019.

² BPS, Statistik Indonesia. 2020.

http://www.bps.go.id/hasil_publicasi/SI_2014/index3.php?pub=Statistik%20Indonesia%202014. Diakses pada Oktober 2020.

2.1.2. Socio-economic Profile

Export-import¹: In 2019, the value of Indonesia exports was USD 167,682.996 million, decreased by 6.9% compared to 2018 which was USD 180,012.7 million. This is due to the lower import value of oil & gas and non oil & gas commodities.

In 2019, export value of several main commodities in agriculture sector such as coffee, medicinal plants-aromatic-spices, and bird's nest have yielded USD 0.87 billion, USD 0.59 billion, and USD 0.36 billion respectively. In industrial sector, palm oil, iron & steel, and apparel have yielded consecutively USD 15.57 billion, USD 7.91 billion, and USD 7.07 billion. In mining sector, coal, lignite, and copper ore have yielded USD 18.96 billion, USD 2.77 billion, and USD 1.28 billion respectively. In terms of export distribution, 73.3% of Indonesia's exported goods are marketed to APEC countries, and it decreased by 5.76% in 2019. In this region, countries with biggest foreign exchange are China, United States of America, and Japan. Exports from these countries account for 36.9% of the total exports.²

In the same period, the import value was USD 171,275.737 million, derived from oil & gas worth of USD 21,885.3 million (13%) and non oil & gas worth of USD 149,390.4 million (87%). However, compare to 2018, import value decreased by 9.24%, triggered by lower import value for oil & gas by 26.73% (USD 7,983.5 million) and non oil & gas by 5.95% (USD 9,452.1 million).

The main exporting country to Indonesia is China, worth of USD 44,930.6 million (26.23%), followed by Singapore, worth of USD 17,589.8 million (10.27%), and Japan, worth of USD 15,661.8 million (9.14%). Based on category of use of economic goods, it was dominated by raw/auxiliary materials of USD 126,355.5 million (73.77%), followed by capital goods of USD 28,466.2 million (16.62%), and consumer products of USD 16,454.0 million (9.61%).³

¹ Data ekspor dan impor, tersedia di: www.bps.go.id. Diakses pada Oktober 2020.

² Buletin Statistik Perdagangan Luar Negeri Indonesia Ekspor 2019. tersedia di: www.bps.go.id. Diakses pada Oktober 2020.

³ Ibid.

Table 2.1 Foreign trade balance of 2011-2019 (in million USD)¹

Year	Export ¹⁾			Import ¹⁾			Balance		
	Total	Oil & gas	Non-Oil & gas	Total	Oil & gas	Non-Oil & gas	Total	Oil & gas	Non-Oil & gas
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
2011	203,496.6	41,477.0	162,019.6	177,435.6	40,701.5	136,734.1	26,061.0	775.5	25,285.5
2012	190,020.3	36,977.3	153,043.0	191,689.5	42,564.2	149,125.3	-1669.2	-5,586.9	3,917.7
2013	182,551.8	32,633.0	149,918.8	186,628.7	45,266.4	141,362.3	-4076.9	-12,633.4	8,556.5
2014	175,980.0	30,018.8	145,961.2	178,178.8	43,459.9	134,718.9	-2198.8	-13,441.1	11,242.3
2015	150,366.3	18,574.4	131,791.9	142,694.8	24,613.2	118,081.6	7671.5	-6,038.8	13,710.3
2016	145,186.2	13,105.4	132,080.8	135,652.8	18 739,2	116,913.6	9533,4	-5633,8	15,167.2
2017	168,828.2	15,744.4	153,083.8	156 985,6	24 316,2	132 669,4	11 842,6	-8571,8	20,414.4
2018	180,012.7	17,171.7	162,841.0	188 711,3	29 868,8	158 843,5	-8698,6	-12 697,1	3998,5
2019	167,497.0	12,504.8	154,992.2	171 275,7	21 885,3	149 390,4	-3778,7	-9380,5	5601,8

Note: ¹⁾Export value expressed in Free on Board (FOB) while import value expressed in Cost, Insurance, and Freight (CIF).

*Provisional figures

2.1.3 Profile of Economy Sectors

Agriculture, Forestry, and Fishery: In 2018, it was known that the total area of agricultural land was 34,830,063 acres, consist of irrigated and non-irrigated rice fields, rain-dependent field, dry cultivation field, and land that was temporarily not cultivated. Based on BPS data for February 2019, these sectors were ranked first for main occupational field (aged 15 years and over) in 2011-2019 period with total population of 38,109,196 people. This shows that the agriculture, forestry, and fishery sectors still have a big role in supporting the economy as a livelihood for the population.

Based on occupational field, agriculture, forestry, and fishery sectors contributes 12.72% to the economic structure in 2019. GVA was dominated by subcategories of agriculture, farming, hunting, and agricultural services by 9.41%. Contribution of these occupational field to the GDP were decline compare to 2018.

¹ BPS, Statistik Indonesia.2020. Diakses pada Oktober 2020.

² Statistik Lahan Pertanian Tahun 2014-2018. Pusat Data dan Sistem Informasi Pertanian 2019. Kementerian Pertanian. Dikutip pada November 2020.

Table 2.2 GDP distribution in agriculture, forestry, and fishery based on current prices of 2015-2019 (%)

No	Occupational Field	2015	2016	2017	2018	2019
1	Agriculture, Farming, Hunting, and Agricultural Services	76.13	75.79	75.37	74.57	73.97
	a. Crops	25.55	25.44	24.55	23.66	22.19
	b. Horticulture	11.22	11.21	11.04	11.51	11.86
	c. Plantation	26.06	25.65	26.37	25.74	25.70
	d. Farming	11.84	12.03	11.96	12.22	12.76
	e. Agricultural and Hunting Services	1.46	1.46	1.46	1.45	1.46
2.	Forestry and Logging	5.29	5.24	5.12	5.12	5.17
3.	Fishery	18.58	18.98	19.51	20.30	20.86
	Agriculture	100	100	100	100	100

Processing Industries: Based on occupational field, the economic sector in 2019 was dominated with processing industries by 19.70%. In this industry, the gross value added (GVA) was dominated with subcategory of food and beverages by 6.40% and coal and oil & gas refinery by 2.13%.

Wholesale and Retail; Car and Motorcycle Repair: This sector was dominated with subcategory of wholesale and retail for non-car and motorcycle by 10.38% in 2019. Despite this category contributed the second largest to the GDP, the contribution value has continued to decline since 2015.

Mining and Extraction Industries¹: During 2013-2018, the growth in mining and extraction industries were tend to fluctuate. In 2018, the recorded growth were 2.16% but then slow down to 1.22% in 2019. Generally, each subcategory shown variative growth compare to previous year. Subcategory of coal and lignite mining were the fastest growing, counting 10.20% in 2019 or increased by 4.01% from 2018. In the opposite, subcategory of metal ore mining were contracted deeply in 2019 by minus 15.15%, decreasing drastically compare to previous year which were growing by 9.01%. The total contribution of mining and extraction industries in 2019 were 7.26%, lower than the previous year which were 8.08%. This category contribution to GDP of 2019 were supported by subcategory of oil, gas, and geothermal mining by 2.78%, coal and lignite mining by 2.33%, metal ore mining by 0.61%, and other mining and extraction by 1.54%.

¹ BPS, Pendapatan Nasional Indonesia, 2015-2019. Diakses pada Oktober 2020.

Electricity & Gas Supply; Water Supply; Solid Waste Management, Waste & Recycle, and Construction¹: The three components have been contribute to national GDP. Electricity and gas supply contribution in 2019 was 1.17%, lower than 2018 which was 1.19%. For water supply, solid waste management, waste and recycle, the business field have raised from 5.56% in 2018 to 6.83% in 2019. Meanwhile, its contribution to GDP for the last 5 years was 0.07%. For construction, the growth has been slow down from 6.09% in 2018 to 5.76% in 2019. Nevertheless, its contribution to GDP have raised from 10.53% in 2018 to 10.75% in 2019.

Service industry: Service industry such as real estate, service company, government administration, defense, and mandatory social security, education service, health service, and other social service have been contribute to national GDP.

2.2. Institutional Policy and Regulatory Framework

2.2.1. Regulatory Framework on POPs

Indonesia has ratify the Stockholm Convention as outlined in Law Number 19 of 2009 on Ratification of the Stockholm Convention on Persistent Organic Pollutants (POPs). Post ratification, Government of Indonesia have amended several laws to be adjusted with the obligations under the Stockholm Convention. List of laws and regulations issued related to POPs serve in Table 2.3.

Table 2.3. Laws and Regulations Related to POPs

No	Laws/Regulations	Scope of Provisions
1.	Law Number 12 of 1992 on Plants Farming System	<ul style="list-style-type: none"> • Pesticides to be distributed within the Republic of Indonesia have to be labelled & registered, meet the quality standard, effective, and safe for human and environment (Article 38) • Government set up the quality standard and types of pesticides which are allowed to be imported (Article 38) • Government register and monitor the supply, distribution, and use of pesticides (Article 39) • Government may prohibit or restrict distribution and/or use of certain pesticides (Article 40)
2.	Law Number 17 of 2006 on Revision of Law Number 10 of 1995 on Customs	Regulate supervision on traffic of goods from or into customs area and collection of import duties

¹ BPS, Pendapatan Nasional Indonesia, 2015-2019. Diakses pada Oktober 2020.

No	Laws/Regulations	Scope of Provisions
3.	Law Number 18 of 2008 on Municipal Waste Management	Regulate overall municipal waste management, including obligation to manage household/ domestic waste and specific waste; prohibition to incinerate certain waste that is not in accordance with the technical requirements of municipal waste management (which could become source to POPs releases)
4.	Law Number 22 of 2009 on Traffic and Road Transportation	<ul style="list-style-type: none"> • Set up provision on road transportation, including specific goods transportation • Specific goods transportation is transportation which require specially designed vehicle to transport goods in bulk, liquid, and gas phase, container, plants, living animals, heavy equipment, and dangerous goods, such as: (1) explosive; (2) compressed gas, liquefied gas, dissolved gas at certain temperature or pressure; (3) flammable liquids; (4) flammable solids; (5) oxidizing substances; (6) toxic and contagious substances; (7) radioactive materials; and (8) corrosive substances (explanatory clause of Article 160) • Transporter of specific goods are liable to prepare temporary storage and responsible for developing system and procedure of handling the specific/ dangerous goods before being loaded to public vehicles (Article 163)
5.	Law Number 30 of 2009 on Electrical Energy	<ul style="list-style-type: none"> • Any electrical installation have to be environmentally reliable, safe, and friendly • Sanction to the owner of installation whom not meet criteria of environmentally reliable, safe, and friendly due to safety jeopardize
6.	Law Number 36 of 2009 on Health	<ul style="list-style-type: none"> • Government, local government, and public should guarantee the availability of healthy environment that have no impact to human health (Article 163) • Healthy environment is free from any source that might cause health disorders, such as: (a) liquid waste; (b) solid waste; (c) gaseous waste; (d) municipal waste that is not processed in accordance with the requirements set by the government; (e) disease-carrier animals; (f) hazardous substances; (g) noise that exceed the threshold limit; (h) ionized & non-ionized radiation; (i) polluted water; (j) polluted air; and (k) contaminated foods (Article 163)
7.	Law Number 32 of 2009 on Environmental Protection and Management	<p>a. The objectives of environmental protection and management are to protect the territory of the Republic of Indonesia from pollution and/or environmental degradation; ensure the safety, health, and life of humans; ensure the sustainability of any living things and the ecosystem; preserve environmental functions; and anticipate global environmental issues</p> <p>b. In order to achieve these objectives:</p> <ul style="list-style-type: none"> • Any person willing to import, produce, transport, distribute, store, use, dispose, process, and/or pile up hazardous substances to/in the territory of the Republic of Indonesia are liable to manage their hazardous substances (Article 58). • Any person generating hazardous wastes are liable to manage the hazardous wastes generated (Article 59)

No	Laws/Regulations	Scope of Provisions
8.	Law Number 3 of 2014 on Industry	<p>a. The objectives of industry are:</p> <ul style="list-style-type: none"> • To build national industry as the pillars of national economic; • To build strong structure of industry; • To create an independent, competitive, modern, and green industry; • To ensure business certainty, fair competition, and avoid monopoly by certain group or person which could disserve the public; • To create business opportunities and expand occupational field; • To ensure equitable industrial development throughout Indonesia in order to strengthen national resilience; and • To increase prosperity and welfare of the public in a fair manner <p>b. Green industry is industry in which the production process prioritize the efficiency and effectiveness use of sustainable resources, thus making industrial development align with preserving environmental function and also benefitting the public</p>
9.	Law Number 7 of 2014 on Trade	<ul style="list-style-type: none"> • Trade policy is build upon two principals, one of them is environmentally friendly (Article 2) • Administration of trade activities are aimed to increase national economic growth; escalate the use and trade of local products; ensure smooth distribution and availability of staple goods and essential goods; improve trade facilities and infrastuctures; improve natural resources protection. • Liability to register goods related to security, safety, health, and environment for producer and importer to the Minister of Trade and label the goods and/or its packaging by its registration numbers (Article 32 subsection 1). • Government set up the restriction and prohibition for trade of goods and/or services to fit national interest, such as: protect the health and safety of humans, animals, fishes, plants, and environment (Article 35 subsection 1(d)). • Government ban the import or export of goods to fit national interest, such as: protect the health and safety of humans, animals, fishes, plants, and environment (Article 50 subsection 2 (c)). • Government may restrict the import and export to fit national interest, such as: protect the health and safety of humans, animals, fishes, plants, and environment (Article 54 subsection 1 (b)).
10.	Law Number 11 of 2020 on Job Creation	<ul style="list-style-type: none"> • The Job Creation Law aims to increase the investment and business ecosystems through (i) implementing risk-based business licensing, (ii) simplifying primary requirements for business licensing, (iii) simplifying sectoral business licensing, and (iv) simplifying investment requirement

No	Laws/Regulations	Scope of Provisions
		<ul style="list-style-type: none"> • This Law changes, removes, or stipulates new regulations for several provisions related to Business Licensing as regulated in Law Number 32 of 2009. • Regulating the simplification of the basic requirements for business licensing, one of which includes environmental approval
11.	Government Regulation Number 7 of 1973 on Supervision of Distribution, Storage, and Use of Pesticides	Regulate supervision of permit for distribution, storage, and use of pesticides
12.	Government Regulation Number 74 of 2001 on Hazardous Substances Management	<ul style="list-style-type: none"> • Regulate hazardous substances management, including several types of POPs, such as: Aldrin, Chlordane, Dieldrin, Endrin, Heptachlor, Hexachlorobenzene, Mirex, Toxaphene, PCBs, DDT, Hexachlorocyclohexane dan Lindane. • Hazardous substances are divided into three categories: allowed, banned, and restricted hazardous substances.
13.	Government Regulation Number 14 of 2012 on Electricity Supply Related Activities	Business owner have to fulfill criteria of environmentally reliable, safe, and friendly
14.	Government Regulation Number 74 of 2014 on Road Transportation	Regulate provisions for permit of specialty goods transport (Article 88)
15.	Presidential Regulation Number 63 of 2018 on Determination and Registration of Article related to Security, Safety, Health, and Environment	Policy on used cars, used electronic, and electronic wastes.
16.	Government Regulation Number 27 of 2020 on Specific Waste Management	Regulate solid wastes that need specific management due to its properties, concentration, and/or volume, one of which is solid waste containing hazardous substances
17.	Government Regulation Number 22 of 2021 on Implementation of Environmental Protection and Management	<p>Regulate environmental approval; water quality protection and management; air quality protection and management; marine quality protection and management; environmental degradation control; hazardous and non-hazardous waste management; guarantor's information for restoration of environmental functions; environmental information system; coaching and supervision; and imposition of administrative sanctions.</p> <p>Regulate hazardous wastes from unspecified sources, such as:</p> <ul style="list-style-type: none"> • POPs: Aldrin; Chlordane; DDT; Dieldrin; Endrin; Heptachlor; Toxaphene; Hexachlorobenzene

No	Laws/Regulations	Scope of Provisions
		<ul style="list-style-type: none"> • Waste containing POPs and UPOPs • Waste from industrial sources, pesticides, and agrochemical products • Hazardous substances packaging <p>Regulate quality standards for TCLP on POPs: Aldrin, Dieldrin, DDT, Chlordane, Endrin, Heptachlor, Hexachlorobenzene, Lindane, Pentachlorophenol, and Toxaphene.</p> <p>Regulate POPs parameter, such as: Aldrin, Chlordane, Dieldrin, Endrin, Heptachlor, Lindane, Toxaphene, BHC, and DDT for Class 1 water quality (water use as raw water for drinking water and/or other use that require similar water quality)</p>
18.	Head of Agency of Environmental Impact Control Decree Number 3 of 1995 on Technical Requirements for Hazardous Waste Treatment	<ul style="list-style-type: none"> • Regulate POPs concentration on waste extraction test (TCLP) – Table 1. Quality standard of TCLP for: Aldrin, Dieldrin, Chlordane, Endrin, Heptachlor, Hexachlorobenzene, Lindane, PCBs, and Toxaphene • Regulate quality standard of Destruction and Removal Efficiency (DRE) for POPs incinerator: PCBs, PCDFs, and PCDDs. DRE quality standard for those three types of POPs should be equal or above 99.9999%. • Regulate quality standard of waste water originated from management of industrial effluent containing hazardous substances (Table 4) for PCBs, PCDFs, and PCDDs.
19.	Ministerial Regulation of Health Number 472 of 1996 on Hazardous Substances Security for Health	Regulate use of POPs, such as: Endosulfan, Hexachlorobenzene, and Heptachlor
20.	Ministerial Regulation of Health Number 492 of 2010 on Quality Requirements of Drinking Waters	Maximum concentration of PCP allowed is 0.009 mg/l
21.	Head of Agency of Food and Drugs Control Regulation Number HK.03.1.23.07.11.6664 of 2011 on Food Packaging Supervision	Regulate Hexachlorobenzene (HCB) as contact material (solvent) of food which is banned to be use as food packaging
22.	Ministerial Regulation of Manpower and Transmigration Number 13 of 2011 on Threshold Value of Physical and	Regulate chemical threshold value for POPs in the workplace, such as: Aldrin, DDT, Dieldrin, Endosulfan, Endrin, Hexachlorobenzene, Chlordane, and Toxaphene

No	Laws/Regulations	Scope of Provisions
	Chemical Factors in the Workplace	
23.	Ministerial Regulation of Agriculture Number 107 of 2014 on Pesticides Supervision	Regulate pesticides supervision in details, including series of inspection activities on supply, production, distribution, storage, use, and destruction of pesticides in order to ensure its quality and effectiveness, not harm to human health and safety, and also to the environmental sustainability
24.	Ministerial Regulation of Environment and Forestry Number 63 of 2016 on Requirements and Procedures for Hazardous Waste Landfill at Final Landfill Facilities	<ul style="list-style-type: none"> Regulate total concentration of hazardous waste and its landfill category (Annex I) for POPs, such as: Aldrin, Dieldrin, DDT, Chlordane, Heptachlor, Lindane, Pentachlorophenol, Hexachlorobutadiene, and PCBs Regulate POPs concentration in waste extraction test (TCLP) (Annex II). Quality standards of TCLP test for POPs, such as: Aldrin, Dieldrin, DDT, Chlordane, Endrin, Heptachlor, Hexachlorobenzene, Lindane, Pentachlorophenol, Hexachlorobutadiene, and Toxaphene Regulate quality standards of final landfill leachate (Annex III) for POPs, such as: PCBs, Polychlorinated dibenzofuran (PCDFs), and Polychlorinated dibenzo-p-dioksin (PCDDs)
25.	Ministerial Regulation of Environment and Forestry Number 56 of 2015 on Procedure and Technical Requirements for Waste Management from Health Service Facilities	Regulate several POPs parameters as a part of TCLP quality standards and air emission quality standards for incinerators
26.	Ministerial Regulation of Health Number 70 of 2016 on Standard and Requirements of Healthy Industrial Working Environment	Threshold value for Time Weighted Average (TWA) of PCP is 0.5 mg/m ³
27.	Ministerial Regulation of Trade Number 94 of 2017 on Third Revision of Ministerial Regulation of Trade Number 87 of 2015 on Import Provisions of Specific Products	Arrangement of substances containing flame retardant, such as in clothes use as fire protection and monitor/projector
28.	Head of Agency of Food and Drugs Control Regulation Number 8 of 2018 on Maximum Limit for Chemical	<ol style="list-style-type: none"> Regulate quality standards on maximum limit of dioxin for processed food products Maximum limit of total dioxin in processed food are as follows: <ul style="list-style-type: none"> Processed meat (except offal/innards) 2.5 pg/g fat (WHO-PCDD/F-TEQ)

No	Laws/Regulations	Scope of Provisions
	Contamination in Processed Food	<ul style="list-style-type: none"> • Processed heart/liver (except fish liver) 1.25 pg/g gross weight (WHO-PCDD/F-TEQ) • Processed fish 3.5 pg/g gross weight (WHO-PCDD/F-TEQ) • Processed dairy, including butterfat 2.5 pg/g fat (WHO-PCDD/F-TEQ) • Processed egg 2.5 pg/g fat (WHO-PCDD/F-TEQ) • Oil and fat 2.5 pg/g fat (WHO-PCDD/F-TEQ)
29.	Ministerial Regulation of Environment and Forestry Number P.101/MENLHK/SETJEN/KUM.1/11/2018 of 2018 on Guidance for Recovery of Hazardous Waste Contaminated Sites	Regulate several POPs parameters as a part of TCLP quality standards and total concentration of the pollutants, and also regulate the procedure for recovery of hazardous waste contaminated sites
30.	Ministerial Regulation of Trade Number 118 of 2018 on Import Provisions of Used Capital Goods	Set up technical criteria as requirements for type of used electronics that allowed to be imported, such as: monitors and screens
31.	Ministerial Regulation of Environment and Forestry Number 15 of 2019 on Quality Standard of Thermal Power Plant Emission	<ul style="list-style-type: none"> • Dioxins and furans has been listed as one of pollutants in which emission content has to be measured • Regulate nine types of thermal power plant, one of which is Incinerator for Solid Waste-to-Energy Power Plant • Monitoring of emission quality standards of dioxins and furans from municipal waste-fueled power plant should be done every 5 years. Based on Annex VII, quality standard value of emission of dioxins and furans from Incinerator for Solid Waste-to-Energy Power Plant is 0.1 mg/Nm³
32.	Ministerial Regulation of Trade Number 18 of 2019 on Testing Method, Registration Procedure, Supervision, Cessation of Trade Activities, and Withdrawal of Goods related to Safety, Health, and Environment	Regulate testing method, registration procedure, supervision, and withdrawal of goods containing chemicals use as flame retardant (pentaBDE) and water repellent (PFOA and PFOS)
33.	Ministerial Regulation of Agriculture Number 43 of 2019 on Pesticides Registration	<ul style="list-style-type: none"> • Regulate procedure for registration and use permit of pesticides • Regulate prohibition of active ingredients and additives for pesticides formulation which listed as POPs under the Stockholm Convention

No	Laws/Regulations	Scope of Provisions
34.	Ministerial Regulation of Transportation Number 60 of 2019 on Penyelenggaraan Angkutan Barang Dengan Kendaraan Bermotor di Jalan	Not specifically regulate on POPs transportation, only generally set up the procedure and requirement of specific transport, including dangerous goods (Article 9 to Article 17)
35.	Ministerial Regulation of Environment and Forestry Number P.10/MENLHK/SETJEN/P LB.3/4/2020 of 2020 on Procedure of Characteristic Test and Status Determination for Hazardous Waste	Regulate several POPs parameters as a part of TCLP quality standards
36.	Ministerial Regulation of Environment and Forestry Number P.12 of 2020 on Hazardous Waste Storage	Regulate procedure of hazardous waste storage and include POPs as quality standard for waste water in hazardous waste storage facility
37.	Ministerial Regulation of Trade Number 12 of 2020 on Import Prohibition of Goods	Regulate type of goods prohibited to be imported, including: <ul style="list-style-type: none"> • POPs, which classified as hazardous substances, such as: Aldrin, DDT, Chlordane, Dieldrin, Endrin, Heptachlor, Mirex, Hexachlorobenzene, PCBs, and Toxaphene • Insecticides, rodenticides, fungicides, herbicides, anti-sprouting products, plant growth regulator, and disinfectant containing Aldrin, Chlordane, Heptachlor, DDT, Hexachlorobenzene, Dieldrin, and Toxaphene • Mixture and preparation containing one or more of following substances: Polychlorinated biphenyls (PCBs), Aldrin, Toxaphene, Chlordane, Dieldrin, Endrin, Heptachlor, Mirex, Hexachlorobenzene
38.	Ministerial Regulation of Environment and Forestry Number P.18 of 2020 on Utilization of Hazardous Waste	Regulate procedure for utilization of hazardous waste
39.	Indonesian National Standard Number 8360:2017 on "Textile – Test procedure to determine PFOS and PFOS-content on materials"	Regulate procedure for determination test of PFOS and PFOA-content on materials

Up to now, not all POPs listed in the Convention are administrated in laws and regulation of Indonesia. In the meantime, the Government has been preparing the revision of Government Regulation Number 74 of 2001 on Hazardous Substances Management. The revision would include update on POPs list. Identification of tariff/ harmonized system code (HS Code) for the updated POPs list as seen on Table 2.4.

Table 2.4 Tariff/Harmonized System Code of POPs

No.	POPs	CAS Number	Tariff/ HS Code
1	Aldrin	309-00-2	2903.82.00
2	Chlordane	57-74-9	2903.82.00
3	Dichlorodiphenyltrichloroethane (DDT)	50-29-3	ex 2903.92.00
4	Dieldrin	60-57-1	2910.40.00
5	Endrin	72-20-8	2910.50.00
6	Heptachlor	76-44-8	2903.82.00
7	Hexachlorobenzene (HCB)	118-74-1	Ex 2903.92.00
8	Mirex	2385-85-5	2903.83.00
9	Toxaphene	8001-35-2	Ex. 2903.89.00
10	Polychlorinated biphenyls (PCBs)	1336-36-3	Ex 2903.99.00
11	Polychlorinated dibenzo-p-dioxins (PCDD)		
12	polychlorinated dibenzofurans (PCDF)		
13	Alpha Hexachlorocyclohexane	319-84-6	Ex. 2903.81.00
14	Beta Hexachlorocyclohexane	319-85-7	Ex. 2903.81.00
15	Chlordecone	143-50-0	2914.71.00
16	Hexabromobiphenyl (HBB)	36355-01-8	2903.94.00
17	Hexabromodiphenyl ether and heptabromodiphenyl ether	68631-49-2; 207122-15-4; 446255-22-7; 207122-16-5	Ex. 2909.30.00
18	Lindane	58-89-9	Ex. 2903.81.00
19	Pentachlorobenzenes (PCBs)	608-93-5	2903.93.00
20	Perfluorooctane sulfonic acid, its salts and perfluorooctane sulfonyl fluoride	1763-23-1; 307-35-7	2904.31.00; 2904.36.00
21	Tetrabromodiphenyl ether and Pentabromodiphenyl ether	5436-43-1; 60348-60-9	Ex. 2909.30.00
22	Technical Endosulfan and its related isomers	115-29-7; 959-98-8; 33213-65-9	2920.30.00; Ex. 2920.90.00
23	Hexabromocyclododecane (HBCD)	25637-99-4; 3194-55-6	Ex. 2903.89.00
24	Hexachlorobutadiene (HCBD)	87-68-3	Ex. 2903.29.00

No.	POPs	CAS Number	Tariff/ HS Code
25	Pentachlorophenol and its salts and esters (PCP)	87-86-5 (Pentachlorophenol); 131-52-2 (sodium pentachlorophenate); 27735-64-4 (as monohydrate); 3772-94-9 (pentachlorophenyl laurate); 1825-21-4 (pentachloroanisole)	2908.11.00; Ex. 2908.19.00; Ex. 2908.19.00; Ex. 2915.90.90; Ex. 2908.19.00
26	Polychlorinated Naphthalenes (PCNs)	70776-03-3	Ex. 3824.99.99
27	decabromodiphenyl ether (commercial mixture, c-deca-BDE)	1163-19-5	Ex. 2909.30.00
28	Short-chain chlorinated paraffins (SCCP)	85535-84-8	Ex. 3824.99.99
29	Dicofol	115-32-2; 10606-46-9	Ex. 2906.29.00
30	Perfluorooctanoic acid (PFOA), its salts and PFOA-related compounds	335-67-1	Ex. 2915.90.90

2.2.2. The Role and Responsibility of Government, Non-Ministerial Agencies and Other Government Bodies Involved in the Life-Cycle of POPs

In Indonesia, POPs is managed together by line ministries, agencies, and other related stakeholders. POPs management require coordination and team-work from all stakeholders. Advice and inputs from stakeholders is the key to successful implementation of POPs management policy in Indonesia. Involvement, role, and responsibility of all stakeholders are listed in Table 2.5.

Table 2.5 Role and Responsibility Related to POPs

No.	Institution	Role and Responsibility
1.	Ministry of Environment and Forestry (MoEF)	National Focal Point and Official Focal Point of the Stockholm Convention Control and supervision on POPs management and POPs-containing waste Set up POPs quality standards in environmental media Monitor emissions and releases of POPs
2.	Ministry of Agriculture (MoA)	Issue pesticides use permit Supervision on pesticides use Set up POPs quality standards in environmental media Carry out research on POPs

No.	Institution	Role and Responsibility
3.	Ministry of Industry (Mol)	Coaching and supervision on industrial activities
4.	Ministry of Trade (MoT)	Arrangement and supervision on import, export, and distribution of goods
5.	Ministry of Health (MoH)	Arrangement and supervision on use and impact of use of POPs to the public
6.	Ministry of Energy and Mineral Resources (MEMR)	Arrangement on use and control of emission and release of POPs in energy and mineral resources sector, including mining, oil, and gas
7.	Ministry of Manpower (MoM)	Arrangement and supervision on use and threshold value of POPs in the workplace
8.	Ministry of Transportation (MoTransp)	Arrangement and supervision on POPs transportation
9.	Ministry of Women Empowerment and Children Protection	Raise awareness on POPs impact to women and children
10.	Ministry of Finance (MoF)	Arrangement and supervision on import and export of POPs and/or article containing POPs
11.	Ministry of National Development Planning	Set up plan for national development programme
12.	Ministry of Foreign Affairs (MoFA)	Enhancement of international cooperation (bilateral, regional, and multilateral) on POPs management
13.	Ministry of Research and Technology / National Agency for Research and Innovation	Carry out research and study on POPs
14.	National Agency of Drug and Food Control (NA-DFC)	Arrangement and supervision of hazardous substances use in drug and food
15.	Indonesian Institute of Sciences	Carry out research on POPs
16.	Agency for the Assessment and Application of Technology	Carry out research and study on POPs
17.	National Standardization Agency	Carry out product standard and testing method
18.	Ministry of Education and Culture	Introduce POPs to the students
19.	Ministry of Law and Human Rights	Perform national legislation drafting
20.	Ministry of Home Affairs	Coordinate programme, activities, and budget with the local government
21.	Cabinet Secretary	Reporting on performance of national priority programme implementation to the President
22.	Provincial government	Supervision on hazardous waste management based on its authorization
23.	Local government (Regency/City)	Supervision on hazardous waste management based on its authorization
24.	Police, Prosecutor, Court, and Supervisor and Investigator of Civil Servant	Supervision, investigation, prosecution, and adjudication on environmental pollution cases related to POPs

No.	Institution	Role and Responsibility
25.	Industries, enterprises	Implement policy on POPs prohibition, restriction, and/or its management
26.	Higher Education and Academia	Carry out research and study on POPs
27.	Non-Governmental Organization (NGO)	Carry out advocacy and campaign on POPs management issues

2.3. Identification of POPs Status in Indonesia

2.3.1. Identification of POPs Pesticide (Annex A, Part I of Chemicals)

Based on data from the Imported Foreign Trade Statistics Bulletin Catalog in December 2019, Indonesia has an import value of pesticides with the types of insecticides, herbicides, and fungicides of 92,535,758 kg valued for USD 479,942,056. Although POPs-Pesticides have been banned from being used as pesticides, imports of some POPs-Pesticides are still being found. Based on these documents, there were still 42,566 kg of Chlordecone imported in 2018 and 34,111 kg in 2019. However, based on data from the Pesticide Information System, there were no licensed pesticide products containing Chlordecone.

Import of Lindane were also still found in the last 3 years with total amount of 256,581 kg imported in 2018, 572,578 kg in 2019, and 230,335 kg in 2020 (until April). The use of Lindane has been banned in Indonesia since 2007. Based on data from the Pesticide Information System, there were no licensed pesticide products containing Lindane. Previously, the use of Lindane was found in flea-killing products, but based on the distribution permit issued by National Agency of Drug and Food Control (NA-DFC), the current use of Lindane has been replaced by Permethrin.

By tracing the import statistical data, there were no imports of Endosulfan in 2018. However, in 2019, there were 9 kg imported and 2 kg imported from January 2020 to May 2020. Meanwhile, based on data from the Pesticide Information System, there were no licensed pesticide products containing Endosulfan. It is necessary to carry out further monitoring and inventory to determine the use of the imported Endosulfan.

The use of Pentachlorophenol as fungicides have been banned in Indonesia since 2007. Based on inventory data conducted by the Ministry of Environment and Forestry (MoEF), in 2015-2020, Pentachlorophenol are still imported to Indonesia. Imported Pentachlorophenol suspected to be used by the industry for wood preservation.

Dicofol is one of insecticides that is widely used to protect tea plants from pests. Currently there is no specific HS Code for Dicofol in Indonesia. Based on the monitoring conducted by MoEF to several importers in Indonesia, Dicofol imported using HS Code 2906.29.00. These HS Code contains a list of descriptions of other items in the Polyphenol group of goods; phenol-alcohol, so it is necessary to check the details of the description of goods with the customs and excise authorities.

Based on data collected by MoEF from several companies, Dicofol is imported by general importers, agents, and distributors of laboratory chemical and equipment. Based on data of distributed Dicofol in Indonesia, it is not used in pesticide production, but used for laboratory purposes as parameter for Dicofol testing. However in several research journals there are still found insecticides containing Dicofol which are used as research materials such as in research conducted by R Sumarmin, et al (2018) and in research conducted by Pratiwi, et al (2012).

2.3.2. Identification of Polychlorinated biphenyls (PCBs) (Annex A, Part II of Chemicals)

Regulation strengthening for PCBs has been carried out in terms of hazardous substances management, hazardous waste management, contaminated sites recovery, and listing PCBs as business fields that are closed for investment. PCBs Official Guidance, Economic Instrument Ekonomi, and Incentive Scheme have been developed. In 2020, Ministerial Regulation of Environment and Forestry Number 29 of 2020 on Polychlorinated Biphenyls (PCBs) Management has been issued and recently PCBs Management Plan (under Introduction of an Environmentally-sound Management and Disposal Systems for PCBs-wasted and PCB-contaminated Equipment project) are on process of development. In parallel, PCBs destruction facility is still under construction.

Study of PCBs in transformers oil has been carried out by the Agency for the Assessment and Application of Technology in 2014 and 2015. The study was on the evaluation of PCBs destruction technology in transformers oil, whether using physical chemistry method and biological chemistry. Moreover, study on economics aspect of PCBs destruction technology implementation were conducted in relation with development of national facility for PCBs destruction. The study was carried out under partnership cooperation with MoEF.

Phase 1 and Phase 2 of PCBs inventory in transformers oil samples have been completed. Phase 1 was conducted in 2015-2016 at 6 provinces which collecting 3,015 samples from 1,033 companies in Java Island. Analysis result showed that 128 samples (4.25%) were contaminated by PCBs in range of ≥ 50 -<10,000 ppm, and 10 samples (0.33%) were contaminated by PCBs in concentration of $\geq 10,000$ ppm. Based on PCBs pollution status ($50 \text{ ppm} \leq \text{PCBs} < 10,000 \text{ ppm}$), accommodation, food and beverage industry have the highest proportion of PCBs contaminated samples of 5.61%, followed by other industries of 5.56% and mining and extraction of 5%. Ten samples (0.42%) from processing industry were having concentraion of more than 10,000 ppm.

Phase 2 inventory was conducted in 2019-2020 with samples from 62 private companies in 12 provinces located in Java and Sumatera island and 1,500 samples of transformers (consist of online and offline transformers) owned by State Electricity Company. In Phase 2, sampling were focused at 9 sectors such as: 1) pulp and paper; 2) oil refinery; 3) smelting /metallurgy; 4) iron and steel; 5) power plant; 6) mining; 7) oleochemical; 8) oil & gas; and 9) petrochemicals / fertilizers.

Based on the type of industry, Phase 2 inventory result showed that 258 samples or 17.1% of the samples were contaminated by PCBs in concentration of above 50 ppm. There were no samples found to have concentration above 10,000 ppm in the Phase 2.

From the integration of Phase 1 and Phase 2 inventory data, total samples achieved was 4,515 samples, in which 3,015 samples (66.63%) were obtained in Phase 1 and 1500 samples (33.37%) were obtained in Phase 2. Based on sampling locations, 750 samples (16.58%) were from Sumatera and 3,774 samples (83.42%) were from Java. Overall, the combined test results showed that 386 samples (8.53%) were contaminated by PCBs at above 50 ppm but below 10,000 ppm ($50 \text{ ppm} \leq \text{PCBs} < 10,000 \text{ ppm}$), 10 samples (0.22%) were contaminated by PCBs at above 10,000 ppm ($>10,000 \text{ ppm}$), and the remaining 4,128 samples (91.25%) were contaminated by PCBs below 50 ppm.

Based on sampling locations, 12.27% samples from Sumatera were contaminated by PCBs at above 50 ppm but below 10,000 ppm ($50 \text{ ppm} \leq \text{PCBs} < 10,000 \text{ ppm}$), while 7.79% samples from Java were contaminated by PCBs at above 50 ppm but below 10,000 ppm ($50 \text{ ppm} \leq$

PCBs <10,000 ppm). Only 0.66 % samples from Java were found to be contaminated by PCBs at above 10,000 ppm.

Integration of Phase 1 and Phase 2 inventory based on type of industry were analysed using IEC 2016 as reference of industry classification for all database. In terms of PCBs contamination, processing industry/manufacture rank the first sector to have the highest proportion of PCBs contaminated samples of 10%, followed by mining and extraction of 6.59%, and accommodation, food and beverage of 5.61%.

In terms of PCBs contaminated status for “production year” variable, analysis result on Phase 1 and Phase 2 showed that transformers produced before 1983 have the highest proportion of PCBs contaminated samples of 18.46%. Meanwhile, for transformers produces in 1993-2002 and 1983-1993 have relatively similar proportion of PCBs contaminated samples of 9.09% and 8.15% respectively. Transformers produced after 2002 constitute the least proportion of PCBs contaminated samples of 2.81%. Thus could be concluded that older transformers have bigger possibility of PCBs contamination.

Other inventory related to waste oil containing PCBs imported to Indonesia was recorded lastly in January 2016. Meanwhile, import of article containing PCBs was recorded lastly in July 2016. Production and export of PCBs were not found in Indonesia.

2.3.3. Identification of POP-Polybrominated diphenyl ethers (PBDEs) (Annex A, Part IV and Part V of Chemicals), Hexabromobiphenyl (HBB) (Annex A, Part I of Chemicals) dan Hexabromocyclododecane (HBCD) (Annex A, Part I and Part VII)

Inventory of penta-BDE and octa-BDE have been conducted in 2013. Inventory result showed that production, export, import, and commercial use data of penta-BDE and octa-BDE in Indonesia are not available. Neither did the information on stockpile. Up to 2020, inventory on POP-BDEs, HBB, and HBCDs have not conducted yet.

Inventory of c-pentaBDE (tetra- and penta-BDE) and c-oktaBDE (hexa- and hepta-BDE) conducted in 2013 were based on data of electronic products that still used and its waste, also vehicles data. During 2014-2020, further inventory of POP-BDEs, HBB, dan HBCDs in Indonesia have not conducted yet.

Government of Indonesia under cooperation activity between Ministry of Industry and United Nations Development Programme (UNDP) has mapped articles containing PBDEs in 2018. The activity were carried out by testing electrical equipments and household electronic equipments located in Bandung, Surabaya, and Batam. Testing result showed that 5 samples were containing deca-BDE above the requirements (1,000 ppm), 11 samples were in range of 100–800 ppm, and 16 samples were undetected. Total samples tested was 32 samples and of all were containing Bromine as measured with XRF in the screening phase. The 5 samples containing PBDEs were from Bandung (1 sample), Batam (1 sample), and Surabaya (3 samples) with product types as follow: water heater, casing of handycam battery (old model), TV casing, calculator casing, and TV remote control.

2.3.4. Identification of Hexachlorobutadiene (HCBD) (Annex A, Part I of Chemicals)

In agriculture sector, HCBD recently not listed as active ingredients and additives determine as prohibited or restricted pesticides. No import data found for HCBD. HCBD potentially contain in fertilizers products, chemicals, and imported processed-rubber. While for production, there was no data found for production and export of HCBD in Indonesia.

In 2017, 5 industries suspected of producing HCBD as side-product and 1 petrochemicals industry suspected to produce product that contain HCBD as impurities were monitored. There is no further study in place to determine HCBD content as side-product up to now.

Some of manufacturing and oil companies have use Hydrofinishing Process (refinery) technology which use distillation columns in its process and not mixing/adding solvent in process of lubricant oil production. Thus the its product and side-product will not potentially produce HCBD or its similar compound.

2.3.5. Identification of Polychlorinated Naphthalenes (PCNs) (Annex A, Part I of Chemicals)

Specific arrangement of PCNs has not been included in laws and regulations of Indonesia, however naphthalenes and its derivatives have been included in the regulation of hazardous waste management. No production data of PCNs found in Indonesia. The Indonesian Customs

Tariff Codes has not define a specific HS Code for PCNs, thus difficult to identify the export and import amount of PCNs.

In 2019, 12 companies in electrical cable sector were inventoried. These companies located in West Jawa, West Jakarta, Pasuruan, and Batam. None of these companies were using PCNs. Based on the inventory result, use of PCNs has been substituted with isolation cable layering substances such as: PVC (Polyvinyl Chloride) Compound, PE (Polyethylene) Compound or XLPE (Crosslinking Polyethylene) Compound.

During 2015-2019, inventory of environmental monitoring data of PCNs (soil, water, air, and its residue) in Indonesia were never conducted. Likewise, there has been no study on health impact of PCNs in Indonesia.

2.3.6. Identification of Short-Chain Chlorinated Paraffins (SCCP) (Annex A, Part I of Chemicals)

Specific arrangement of SCCP has not been included in laws and regulations of Indonesia. Inventory of production source, emission or release of SCCP in Indonesia were never conducted during 2015-2020, except for product inventory containing CP in general. The amount of SCCP exported and imported were also not inventoried yet. There were only imported Chlorinated Paraffins (CP) data during 2014-2016 with total import amount of around 13,521.07 ton, originated from China, India, Japan, Singapore, South Africa, Taiwan, and Thailand. The top 3 exporting countries are India (11,342.42 ton), Thailand (1,143.42 ton), and South Africa (380.16 ton). HS Code for the imported CP as listed in Table 2.6.

Table 2.6 List of HS Code for Imported CP to Indonesia

HS Code	Description of Goods
2712.20.00.00	Paraffin wax containing by weight < 0.75 % of oil
2712.90.10.00	Other paraffin wax containing by weight ≥ 0.75% of oil
2712.90.90.00	Microcrystalline petroleum wax, slack wax, ozokerite, lignite wax, peat wax
2903.19.90.00	Other Saturated chlorinated derivatives of acyclic hidrocarbons
3404.90.90.00	Other artificial waxes & prepared waxes
3809.92.00.00	Oth finish agent, carriers to accelerate the dyeing or fixing of dyestuffs & oth product & prep of a kind used in the paper or like indust
3812.20.00.00	Compound plasticisers for rubber or plastics
3824.82.00.00	Mix & preparation containing pbbs, PCBs, PCTs
3824.90.40.00	Composite inorganic solvents

HS Code	Description of Goods
3824.90.91.00	Naphthenic acids, their water insoluble salts and their esters
3824.90.99.00	Oth prods & preparations cont CFC-11,12, 115, and halon

In 2020, Agency for the Assessment and Application of Technology in collaboration with UNEP environmental expert, National Institute for Environmental Science (NIES Japan), and Secretariat Stockholm Convention Basel Convention Regional Centre for South-East Asia (SCRC-BCRC) Indonesia were conducting SCCPs inventory assessment with Tier 1 procedures.

Environmental monitoring data (soil, water, air, and residue) and health assessment of SCCP have not inventoried yet. However, two companies have been surveyed on using additive or substitution alternative to produce paint, glue, and mortar. Chlorocarbon (Methylene chloride) used as diluent/solvent (paint remover) or Medium Chain Chlorinated Paraffins (MCCP) used as alternative substitution to SCCP. Further study on SCCP substitution alternatives is needed.

2.3.7. Identification of Pentachlorophenol (PCP) and its salts and ester (Annex A, Part I of Chemicals)

Based on BPS-Statistics Indonesia data of 2017, total amount of PCP imported during 2009 - 2017 was 537,052 kg and total export was 32,243 kg. Up to now, inventory of production source, emission, release of PCP, and PCP-containing product in Indonesia were not conducted yet. Likewise, since 2015 there has been no study of PCP substitution alternatives in Indonesia.

In 2018, 18 companies suspected to produce PCP were monitored. The result found that no PCP use as raw material or additives in these companies. Sampling of PCP concentration in river water have been conducted in 3 rivers: Lamong, Citarum, and Belumai rivers. Analysis result of the samples from three rivers were below $5 \mu\text{g}\cdot\text{L}^{-1}$, which is below US-EPA quality standard of $5 \mu\text{g}\cdot\text{L}^{-1}$.¹

¹ Laporan Rekomendasi Penghapusan Direktorat Pengelolaan B3, KLHK. 2018.

2.3.8. Identification of Dichlorodiphenyltrichloroethane (DDT) (Annex B, Part II of Chemicals)

Use of DDT has been banned in Indonesia. Inventory result showed that no import data of DDT ever since. Even if DDT has not used in Indonesia for a long period, residue of DDT in ricefield soil, river water, and shallots are still detected. In 2015, residue were found in ricefield soil of Wonosobo, Banjarnegara, and Cilacap.¹ (See Table 2.7).

Table 2.7 Monitoring Result of DDT in the Ricefield Soil

Type of POPs residue	Amount of POPs residue in the ricefield soil (mg·kg ⁻¹)		
	Wonosobo	Banjarnegara	Cilacap
DDT	0.0231 ± 0.0870	0.0059 ± 0.0056	0.0155 ± 0.0187

DDT residue were detected in the sample of Serayu river water with concentration of 0.0922 ± 0.0000 ppm, however in 2018 DDT was not detected in sample of Citarum river.

Monitoring result in 2018 showed that DDT residue in 10 samples of shallots from Brebes sub-regency were <0,00024 mg·kg⁻¹. Indonesian National Standard Number 7313:2008 not spesifically set up maximum allowable residue of DDT on shallots, thus the closest reference that can be used was for fruit and vegetable which is 1 mg·kg⁻¹. Therefore, p.p'-DDT and o.p'-DDT concentration on shallots were below the maximum allowable residue.

Monitoring result of paddy, corn, and shallot from Cirebon and Karawang regencies in 2020 showed that DDT concentration were below the maximum allowable residue.

2.3.9. Identification of Perfluorooctane sulfonic acid (PFOS), its salts and perfluorooctane sulfonyl fluoride (PFOS-F) (Annex B, Part III of Chemicals)

In 2014, potential amount of PFOS, its salts, and PFOSF in Indonesia estimated based on article or product assume to contain PFOS and PFOS-related. Estimation was made of export and import statistics in several sectors such as: pulp and paper; fire-extinguishing foam; textile; and synthetic carpets. Ever since, inventory of PFOS, its salts, and PFOSF were not conducted yet.

¹ Balai Penelitian Lingkungan Pertanian (Balington), 2015 dan 2018

2.3.10. Identification of Releases of Unintentionally Produced Chemicals (Annex C of Chemicals)

Inventory for unintentional POPs (UPOPs) releases were conducted lastly in 2013-2014. Total releases of dioxins and furans were estimated about 9,881 g toxic equivalent (TEQ). Source of the releases from the highest to the lowest are as follows: open burning (5,547.2 g TEQ), production of chemical and consumer products (2,388.5 g TEQ), waste incineration (812.1 g TEQ), production of iron and non-iron metal (749.8 g TEQ), power plant and boiler (204.8 g TEQ), disposal (111 g TEQ), production of mineral product (38.7 g TEQ), and transportation (22.6 g TEQ). Release of unintentionally produced PCBs was estimated about 4.32 kg TEQ with the highest from heavy-oil burning (4.31 kg TEQ) due to its relatively high emission factor. Release of unintentionally produced HCB was estimated about 1.91 ton per year with the highest from production of chlorinated-aromatic chemicals, especially pigment agent (1.76 ton).¹

Inventory was carried out to various source of releases such as: open burning, production of chemical and consumer products, waste incineration, production of iron and non-iron metal, power plant and boiler, disposal, production of mineral product, and transportation. The inventory method was based on UNEP Toolkit for Identification and Quantification of Releases of Dioxins, Furans and Other Unintentional POPs. Lack of data and infrastructure to analyse dioxins and furans at national level have been causing less measurement data collected. Last inventory data were collected from big industries that financially capable to measure releases of dioxins/furans and several data of releases source that not integrated to the system.

¹ (Purnomo & Shoiful, 2014)

2.3.11. 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

➤ POPs Pesticides

Based on inventory data, there are no production and export found on POP-Pesticides, either the initial POPs or new POP-Pesticides. Inventory result also reveal that there are no import of initial POPs recently. However, new POP-Pesticides such as Chlordane, Endosulfan, Lindane, Pentachlorophenol, and Dieldrin are still imported. Thus, it is possible to find an unknown amount of stockpile in the field. Further inventory is needed to assess the amount of the remaining POP-Pesticides stockpile.

➤ Polychlorinated Biphenyls (PCBs)

In 2015, there was an oil spill from an inactive transformer containing ± 50 liters of Askarel PCB with a concentration of 30,000 ppm on the asphalt road covering $\pm 6 \text{ m}^2$ within the area of PT Goodyear Indonesia. The spill has been decontaminated by digging and taking soil in the contamination area of $\pm 16 \text{ m}^2$ with a depth of 1.5 meters.

➤ Hexachlorobutadiene (HCBD)

No record of stockpile, contaminated sites, and contaminated waste of HCBD from 2015 to 2020.

➤ Polychlorinated Naphthalenes (PCNs)

No record of stockpile, contaminated sites, and contaminated waste of PCNs from 2015 to 2020.

➤ Short-chained Chlorinated Paraffins (SCCP)

No record of stockpile, contaminated sites, and contaminated waste of SCCP from 2015 to 2020.

➤ Pentachlorophenol (PCP)

No record of stockpile, contaminated sites, and contaminated waste of PCP from 2015 to 2020.

➤ POP-Polybrominated Diphenyl Ether (PBDEs), Hexabromobiphenyl (HBB), Hexabromocyclododecane (HBCD)

No record and information found on stockpile, contaminated sites, and contaminated waste of POP-BDEs, HBB, and HBCDs from 2014 to 2020 in Indonesia. This is due to missing of comprehensive inventory. Environmental monitoring data have not included POP-BDEs, HBB, and HBCDs as parameters that have to be tested.

Electronic waste (e-waste) contaminated sites were found in Indonesia. E-waste is source of POP-BDEs, HBB, and HBCDs pollutant. Government of Indonesia has determine several locations polluted by e-waste. However, POP-BDEs, HBB, and HBCDs have not included to the pollutant parameters. Thus, concentration of POP-BDEs, HBB, and HBCDs were not found in the data of contaminated sites.

There were about 118 spots known as disposal location for aluminium smelting ashes. Eleven location of those were identified with total area of 51,367 m², while the volume of contaminated soil around 96,470 m³, or about 146,828 ton. This number was not include the distribution spots for e-waste smelting. Hazardous waste contaminated sites in Tangerang regency were found in Sukatani and Tegal Angus village located in Teluk Naga sub-regency. MoEF has verified the contaminated sites and found 8 spots of open-burning with total area of 1,763 m².

➤ Perfluorooctane Sulfonate (PFOS), its salts, and Perfluorooctane Sulfonyl Fluoride (PFOS-F)

No record of stockpile, contaminated sites, and contaminated waste of PFOS, its salts, and PFOS-F.

2.4. Assessment of POPs Issues

2.4.1. Summary of Future Production, Use and Releases of Pops – Requirements for Exemptions

Article 4 of the Convention define the register of specific exemptions, stated that each Party to the Convention is allowed to register specific exemptions for POPs listed in Annex A or Annex B. Up to now, Indonesia has never register specific exemption for POPs listed in Annex A or Annex B.

In the future action plan, Indonesia will continue to carry out inventory (initial assessment, preliminary inventory, or in-depth inventory) for new POPs, thus there might be possibility for Indonesia to register specific exemptions for POPs listed in Annex A or Annex B.

2.4.2. Monitoring of POPs and its Impact to Environment and Human Health

➤ POPs-Pesticides

Environmental monitoring on POPs pollution was carried out by MoEF in 2018. Monitoring have been done in several location in Brebes regency and showed that there were organochlorines (OCs) residue (Aldrin, Heptachlor, Chlordane, Dieldrin, and Endrin) in shallots. Based on the Indonesian National Standard 7313:2008 on Maximum Allowable Residue, the result of monitoring were still below maximum allowable residue. Heptachlor was not detected in shallots. Therefore, it is concluded that POPs-Pesticides residue in farming commodities consider very low. POPs residue, such as: Lindane, Aldrin, Heptachlor, Chlordane, Endosulfan, Dieldrin, Toxaphene, Dieldrin, DDT, Mirex and Endrin in farming land area in several location in Indonesia have been monitored by the Agency for Research of Agricultural Environment in 2015 and 2018, the monitoring result is as shown in Annex 1, Table 1.

Monitoring of POPs residue in river water have been done at Serayu River (2015) and Citarum River (2018), carried out by Center for Agricultural Environment Research. Monitoring result presented in Annex 1, Table 2. Other POPs residue (Heptachlor, Endosulfan, Dieldrin, Chlordane) in soil of vegetable sentra in several area of Indonesia also being monitored (Annex 1, Table 3). The locations of monitoring were West Java, Central Java, East Java, South Sulawesi, West Sumatera, North Sumatera, West Nusa Tenggara, and Jambi.

POPs-Pesticides monitoring for organochlorine (OCs) in the environment were carried out by Center for Research and Quality Development and Environment Laboratory in 2018. Monitoring result in river water, river sediment, and soil showed that several POPs residue were detected in the environment. From 6 (six) locations of river water samples in Jakarta and 1 (one) from Cianjur (Steam Fired Power Plant of Cijedil), detected several POPs residue from group of HCH (α, β, γ , HCH), Endosulfan, and also DDT and its derivatives (op DDT and pp DDT) with range of $0.01 - 0.37 \mu\text{g}\cdot\text{L}^{-1}$ Annex 1, Figure 1).

POPs-Pesticides detected in river sediment were group of HCH ($\alpha, \beta, \delta, \gamma$ HCH), Aldrin, Endrin, Dieldrin, Heptachlor, Heptachlor epoxide, Cis-chlordane, Trans-chlordane, Endosulfan I, Endosulfan II, Hexachlorobenzene, also DDT and its derivatives (op DDD, pp-DDD, op DDE, pp-DDE, op DDT, pp DDT) in range of $0.02-106 \mu\text{g}\cdot\text{kg}^{-1}$. Group of HCH were detected in range of $<0.4 - 56.22 \mu\text{g}\cdot\text{kg}^{-1}$. DDT and its derivatives were detected in range of $<0.4 - 21.5 \mu\text{g}\cdot\text{kg}^{-1}$. HCB were detected in river sediment from Jakarta in range of $0.04-0.96 \mu\text{g}\cdot\text{kg}^{-1}$ (Annex 1, Figure 2).

POPs-Pesticides also detected in soil. Types of POPs detected in farming land such as: α , β , and γ HCH, Aldrin, Endrin, Dieldrin, HCB, Heptachlor, Endosulfan, also DDT and its derivatives in range of $< 0.4-18.5 \mu\text{g}\cdot\text{kg}^{-1}$ (Annex 1, Figure 3).

Monitoring result of the upstream of Ciliwung river basin in Bogor to its downstream in Jakarta have detected POPs concentration. Monitoring was carried out by Center for Research and Quality Development and Environment Laboratory - MoEF in 2018. POPs were detected either in the river water, river sediment, and soil of farming land around Ciliwung river.

Types of POPs detected in Ciliwung river water were only group of DDTs, group of HCHs, and HCB. Group of DDTs and its derivatives were detected in concentration range of $<0.012-0.026 \mu\text{g}\cdot\text{L}^{-1}$ (Annex 1, Figure 4). Group of HCHs in river sediment were detected in concentration range of $0.80 \text{ ng}\cdot\text{g}^{-1}-200 \text{ ng}\cdot\text{g}^{-1}$. Group of DDT and its derivatives in river sediment were detected in concentration range of $<0.42-42.6 \mu\text{g}\cdot\text{kg}^{-1}$, while other POPs in concentration range of $0.41 - 7.24 \mu\text{g}\cdot\text{kg}^{-1}$ (Annex 1, Figure 5).

POPs also found in plantation soil near Ciliwung river. Group of HCHs were detected in range of $<0.73 - 24.20 \mu\text{g}\cdot\text{kg}^{-1}$, group of DDT and its derivatives in range of $<0.01-14.93 \mu\text{g}\cdot\text{kg}^{-1}$, while the other POPs in range of $0.68-4.99 \mu\text{g}\cdot\text{kg}^{-1}$ (Annex 1, Figure 2).

Monitoring result of POPs-Pesticides at BMKG station of Kototabang in 2018 using passive air sampler showed that majority of POPs-Pesticides were not detected or under detection limit, only PeCB and HCB were detected in concentration between 29-57 $\text{pg}\cdot\text{m}^{-3}$. Some other POPs such as: trans- chlordane, cis- chlordane, and pp-DDE were indicated, but the result laid between Limit of Detection (LOD) and Limit of Quantitation (LOQ) in range of 0,3-1 $\text{pg}\cdot\text{m}^{-3}$ (Annex 1, Figure 7).

POPs monitoring in ambient air at Kemayoran, Jakarta were done under Global Monitoring Plan II (GMP II), a collaboration activity between UNEP and MoEF. The result showed that POPs-Pesticides detected in ambient air in which found on the PUF with majority below 10 $\text{ng}\cdot\text{PUF}^{-1}$, except for HCH, the highest detection was 15 $\text{ng}\cdot\text{PUF}^{-1}$. Toxaphene, Aldrin, and Dieldrin were not detected in ambient air ($< 0,16 \text{ ng}\cdot\text{PUF}^{-1}$). Please see Annex 1, Figure 8 for details.

Result of air monitoring at BMKG station in Jakarta showed that DDT and its derivatives also found in range of 0.34-7.6 $\text{ng}\cdot\text{PUF}^{-1}$. Concentration of DDT and other of its derivatives were detected below 5 $\text{ng}\cdot\text{PUF}^{-1}$. Concentration trend of DDT and its derivatives in ambient air on period of 2018-2019 tend to decline (Annex 1, Figure 9).

Other POPs-Pesticides detected in ambient air in range of <0.01 -9.7 $\text{ng}\cdot\text{PUF}^{-1}$. The highest concentration found was Dieldrin in range of 3.1-9.7 $\text{ng}\cdot\text{PUF}^{-1}$, followed by L-endosulfan in range of <0.39 -5.1 $\text{ng}\cdot\text{PUF}^{-1}$. Concentration trend of L endosulfan were declined as much as undetected or $<0.39 \text{ ng}\cdot\text{PUF}^{-1}$. The other OCs was detected under 5 $\text{ng}\cdot\text{PUF}^{-1}$ (Annex 1, Figure 10).

➤ Polychlorinated Biphenyls (PCBs)

Study in 2013 shows that several food products such as green mussels from Jakarta Bay were reported to contain PCBs.¹ The highest level of PCBs found in bigger size mussels, followed by the medium and small size. However, in general, PCBs level still consider low, thus safe to be

¹ Edward. Kontaminasi senyawa poliklorobifenil (PCB) pada kerang hijau, *Perna viridis* dari Teluk Jakarta. 2016. Pusat Penelitian Oseanografi-Lembaga Ilmu Pengetahuan Indonesia (P2O-LIPI).

consume. Monitoring result of PCBs content in green mussels from Jakarta Bay is presented in Annex 2, Table 1.

Another study by researcher from LIPI (Ambon) in 2016 with subject "Effects of PCBs Accumulation in Water Sediment on Bivalve" showed that PCBs content in sediment could be accumulated into aquatic organisms, especially sessile or other limited movement organisms, such as clam, shellfish, and other molluscas that potentially involve in the food chain. PCBs accumulation affected several body parts of shellfish, such as: adductor muscle, gills, mantle, digestive gland, gonad, and also affected reproduction cycle.

Environmental monitoring on PCBs in ambient air has been carried out in 2018 under POPsEA (Persistent Organic Pollutants in East Asian Countries) monitoring programme in Meteorological, Climatological and Geophysical Agency station (BMKG station) of Kototabang, West Sumatera. PCBs monitoring in ambient air was perform high volume sampler (HVS), showing the existence of PCBs ini rural area of Kototabang which assumed as remote area from pollution sources. Total PCBs from active sampling using high volume sampler (HVS) in BMKG station of Kototabang, West Sumatera showing low result at range of 57-100 $\text{pg}\cdot\text{m}^{-3}$ and average of 88 $\text{pg}\cdot\text{m}^{-3}$ (Annex 2, Table 2).¹

PCBs monitoring was perform using passive air sampler (PAS) in BMKG station of Kototabang, West Sumatera during 2018-2019, showing that total PCBs is higher compare to active sampling using HVS for several hours. PCBs detected at range of 280-430 $\text{pg}\cdot\text{m}^{-3}$ with average of 360 $\text{pg}\cdot\text{m}^{-3}$ (Annex 2, Figure 1).

It can be concluded that PCBs monitoring result in ambient air under UNEP/GMP II programme showing PCBs existence in ambient air. PCBs detected in PUF at range of <0.28-1.7 $\text{ng}\cdot\text{PUF}^{-1}$. Generally, the detection trend were decline from 2018 to 2019. (Annex 2, Figure 2).

➤ Hexachlorobutadiene (HCBD)

Monitoring result of HCBD under UNEP/GMP II project performed in 2018-2019 showing that HCBD detected in ambient air taken from BMKG station located in Jakarta, namely L dan B

¹ Background Air Monitoring of Persistent Organic Pollutants in East Asian Countries 2014 - 2018. POPs Monitoring Project in East Asian Countries, 2020.

HCBD. V HCBD was not detected within the period of monitoring since it was under the detection limit ($< 0.03 \text{ ng} \cdot \text{PUF}^{-1}$). L-HCBD detected in the sampling PUF were in range of $0.05\text{-}0.24 \text{ ng} \cdot \text{PUF}^{-1}$, meanwhile for B-HCBD were in range of $<0.03\text{-}0.17 \text{ ng} \cdot \text{PUF}^{-1}$ (Annex 3, Figure 1).

➤ Polychlorinated Naphthalenes (PCNs)

Environmental monitoring data (soil, water, air, and residue) and health impacts on PCNs are not available.

➤ Short-chained Chlorinated Paraffins (SCCP)

Environmental monitoring data (soil, water, air, and residue) and health impacts on SCCP are not available.

➤ Pentachlorophenol (PCP), its salts and esters

In 2018, MoEF perform monitoring and analysis of POPs in river water from Lamong river (Gresik), Citarum river (West Java), and Belumai river (Deli Serdang). The results show that PCP levels in all sample are still below the US-EPA standards of $5 \mu\text{g} \cdot \text{L}^{-1}$.

➤ Polybrominated Diphenyl Ether (PBDEs)

Monitoring result of PBDE under UNEP/GMP II project performed in 2018-2019 showing that PBDEs detected in ambient air taken from Meteorological, Climatological and Geophysical Agency station (BMKG station) located in Jakarta. The result showing that only BDE 47 that detected dominantly in range of $0.49\text{-}0.93 \text{ ng} \cdot \text{PUF}^{-1}$. BDE 209 detected in range of $1.5\text{-}3.6 \text{ ng} \cdot \text{PUF}$, which consider between LOQ (limit of quantitation) value (Annex 4, Figure 1).

There are some research related to POP-BDEs monitoring available in Indonesia. Ratnaningsih, et. al.¹ measure PBDEs in the sample of polyurethane foam-disc (PUF-disc) attached to passive

¹ Ratnaningsih Dewi, et al. 2017. Pengukuran Senyawa *Polybrominated Diphenyl Ethers* (PBDEs) di Udara Ambien Menggunakan *Polyurethane Foam-Disk* (Puf-Disk). Ecolab Vol. 11, No. 2

air sampler (PAS) placed in two locations representing urban area (Casablanca, Jakarta) and rural area (Citeko, Bogor). The result shows that PBDEs concentration detected in range of 0.13-4.12 $\text{pg}\cdot\text{m}^{-3}$ in Jakarta, while in Bogor detected in range of 0.09-2.59 $\text{pg}\cdot\text{m}^{-3}$.

Sudaryanto (2019)¹ perform study to groupers in Lampung area. The study confirms PBDEs detected in all groupers samples, with the levels being significantly higher ($p<0,01$) in farmed than wild groupers. The result indicates contamination of PBDEs in the water. In 2020, Agency for the Assessment and Application of Technology were looking for opportunity to perform further study on PBDEs with UNEP environmental expert, National Institute for Environmental Science (NIES Japan), and Stockholm Convention Regional Centre - Basel Convention Regional Centre for South-East Asia (SCRC – BCRC Indonesia).

➤ Perfluorooctane Sulfonate (PFOS)

Monitoring result of PFOS in ambient air under UNEP/GMP II project performed in 2018-2019 showing that PFOS are detected in the ambient air. The concentration of total PFOS detected in range of 0.104-0.634 $\text{ng}\cdot\text{PUF}^{-1}$, while for L-PFOS in range of 0.071-0.583 $\text{ng}\cdot\text{PUF}^{-1}$ and br-PFOS in range of 0.030-0.051 $\text{ng}\cdot\text{PUF}^{-1}$ (Annex 5, Figure 1).

PFOS also detected in the water. Concentration of L-PFOS in river water and leachate from final disposal facilities detected in range of 1.2-7.9 $\text{ng}\cdot\text{L}^{-1}$, while for br-PFOS detected in range of 0.5-4.2 $\text{ng}\cdot\text{L}^{-1}$ with ΣPFOS in river water detected in range of 1.69-12.15 $\text{ng}\cdot\text{L}^{-1}$ (Annex 5, Figure 2).

2.4.3. 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

Information and awareness on POPs issue has been exposed to government officials, private sectors, and public. Public information system on POPs are available in the following link: <http://sib3pop.menlhk.go.id/> and <http://www.kelair.bppt.go.id/>.

¹ Sudaryanto, Agus. 2019. Kajian Level Dan Dampak Senyawa Polybrominated Diphenyl Ethers (PBDEs) Pada Ikan Kerapu Budidaya Dan Kerapu Liar Dari Lampung. Jurnal Teknologi Lingkungan Vol. 20, No. 1

➤ Polychlorinated Biphenyls (PCBs)

Several capacity building activities on PCBs for related stakeholders:

1. In 2015, MoEF conduct PCB-Free campaign in Indonesia Environment and Forestry Week and continue to conduct the campaign in 2016.
2. In 2016:
 - a. Conduct training of technical capacity building and laboratory resources for government laboratories. Objectives of the training are to give knowledge on toxicology and environmental behaviour of PCBs; PCBs inventory; methods of sampling and analysis; sampling plan, identification, labelling, and trace-backs; decontamination technology and cleaning of contaminated sites; method to filter/test PCBs from transformer oils using Dexsil LD2000X.
 - b. Conduct dissemination of PCBs inventory result with stakeholders and industry which divided into 5 (five) groups as targeted by the project. The selected industries are located in Banten, DKI Jakarta, West Java, Central Java, Yogyakarta, and East Java. Objectives of this activity are to present background, objectives, and result of PCBs inventory. The dissemination was held 12 times.
 - c. Conduct workshop for public sector to introduce PCBs, regulations on PCBs, economic instrument and incentives for PCBs management, ecotoxicology and technical aspects on PCBs management, and also technology and risk analysis on PCBs management.
3. In 2017, MoEF conduct awareness campaign on PCB-Free Indonesia through brochure, posters, video, and merchandise which circulated to public and related stakeholders, both directly or through social media. The campaign mainly focussing on PCBs impact to environment and human health.

➤ Polybrominated Diphenyl Ether (PBDEs)

Indonesia has compose a training module on use of flame retardants for plastics manufacture and identification of PBDEs in raw materials and also perform training accordingly. Participants of the training are six recycler selected from West Java and East Java which ranging from informal recycler in medium and big scale.

2.4.4. Mechanism to Report Under Article 15 on Measures Taken to Implement the Provisions of the Convention and for Information Exchange with Other Parties to the Convention

The Government of Indonesia has assigned Director General for Solid Waste, Hazardous Waste, and Hazardous Substances Management, MoEF as the National Focal Point (NFP) for Stockholm Convention. NFP is responsible to facilitate information exchange on POPs. NFP has performed information exchange on measures taken to reduce or banned the production, use, and release of POPs at regional and international level through conference, workshop, seminar, etc.

Indonesia has been regularly submitted its National Report through Electronic Reporting System of the Stockholm Convention for second, third, and fourth cycles. The lastly submitted National Report was on September 1, 2019.

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

Regarding POPs analysis, some of government laboratories have been able to analyse POPs in water, sediment and biota, such as Center for Research and Quality Development and Environment Laboratory - MoEF, Center for Environmental Technology - Agency for the Assessment and Application of Technology, Center for Chemistry Research (Indonesian Institute of Sciences), and Center for Agricultural Environment Research - MoA. There are also several non-government laboratories known for its capacity to analyse POPs Pesticides, such as PLN Laboratory, Petrolab Laboratory, Saraswanti Laboratory Jakarta, and Prawira Laboratory which has been accredited to analyse PCBs. However, it is necessary to re-record/re-evaluate the status of each laboratory in Indonesia that have capacity and been certified to perform POPs analysis.

Laboratory for testing PCBs from transformer oils that available in Center for Environmental Technology - Agency for the Assessment and Application of Technology is using gas-

chromatography system equipped with electrons capturing detector. This laboratory is in process of accreditation for testing parameters based on EN61619 method.

In order to raise national awareness and capacity to analyse POPs, MoEF together with UNEP and BCRC-SEA has conducted “International Capacity Building Workshop on POPs Analysis” in 2019. Moreover, Indonesia also join in the “Implementation of the POPs Monitoring Plan – 2 in the Asia Region” project. Scope of the project is Global Monitoring Plan (GMP) of POPs using Passive Air Sampler (PAS) on environmental media (water, sediment, soil, and biota). These activity meant to monitor and evaluate effectiveness of GMP activities.

2.4.6. Relevant System for the Assessment and Listing of New Chemicals

Government Regulation Number 74 of 2001 on Hazardous Substances Management stated that any citizens willing to import new hazardous substances (first-time imported and not-listed as hazardous substances), should follow notification procedures. Notification should be send with G to G (government to government) basis, from exporting country authorities to importing country authorities in charge for environmental impact which is Ministry of Environment and Forestry. This notification will be forwarded to Hazardous Substances Commission, an independent body aimed to give advice/ consideration on hazardous substances management to the government. Based on the Commission decision, MoEF could (1) request to adjust Annex of the Government Regulation (2) give recommendation to Ministry of Trade to approve or decline the import permit. In fact, this mechanism has not been in place. Until this document being made, any new hazardous substances being imported for the first time only require notification and registration to MoEF.

Meanwhile for pesticides, the Ministry of Agriculture has Pesticides Comission that consist of technical teams from ministries, agencies, experts, and academia. This technical teams are responsible to (a) prepare technical data and/or relevant informations for evaluating pesticides registration, and (b) evaluate technical requirements for pesticides registration and/or registered pesticides or permitted pesticide. Evaluation result of the technical teams serve as advice and/or consideration for Head of the Comission to decide the status of pesticide registration, whether be declined, post-poned, or approved.

III. IMPLEMENTATION STATUS NIP POPs 2014

In general, the action plan announced at the NIP POPs 2014 includes all aspects required to fulfill the obligations of the Stockholm Convention. The action plan prepared is divided into 17 groups which are further described in Table 3.1 as follows.

Table 3.1. 2014 NIP POPs Achievements

2014 NIP Action Plan	Performance Indicators	2014 NIP Stakeholder	Status of Achievement / existing condition	Year of Achievement
Regulations strengthening				
1. Review of evaluation and harmonization of all laws and regulations related to the management of hazardous substances as well as management of hazardous waste in Indonesia, related to the Stockholm Convention on POPs.	Reports and recommendations for follow-up harmonization of laws and regulations related to management of hazardous substances as well as hazardous waste in Indonesia, is compiled	MoE, MoLHR, MoTransp, MoA, MoT, MoI, MoH, MoMPT, MoF, NADFC		
2. Review to ensure that all the obligations of the Stockholm Convention are covered in the arrangements of the Draft Government Regulation (RPP) on Hazardous Substances Management and Government Regulation (RPP) on Hazardous Waste Management	Draft of Government Regulation on Hazardous substances Management and Draft of Government Regulation on Hazardous Substances Management and Draft of Government Regulation on Hazardous Waste Management which have put all POPs substances of the Stockholm Convention and its obligations, is compiled.	MoE, MoI, MoTransp, MoA, MoT, MoH, MoMPT, NADFC	1. The Draft Government Regulation on Hazardous Substances Management has been prepared by including POPs materials in accordance with the development of Convention 2. Government Regulation No. 101/2014 concerning Hazardous Waste Management has been issued	1. 2018 2. 2014
3. Review of amendments to the Government Regulation (PP) Number 7 of 1973 along with all its derivative regulations to ensure that all POPs pesticides in the Stockholm Convention	System of enforcing laws and regulations related to the arrangement and management of POPs to the Stockholm Convention, is established.	MoA, MoLHR, MoE, MoH, NADFC	The Minister of Agriculture Regulation number 43 of 2019 concerning Pesticide Registration has been issued, which among other things regulates that POPs pesticides	2019

2014 NIP Action Plan	Performance Indicators	2014 NIP Stakeholder	Status of Achievement / existing condition	Year of Achievement
have been covered, including the details of the arrangements.			are prohibited from being used as pesticides.	
4. Review and application of a system model for increasing the effectiveness of the enforcement of laws and regulations related to the regulation and management of the Stockholm Convention on POPs	Enforcement system of laws and regulations related to the regulation and management of the Stockholm Convention on POPs, is implemented	MoE, MoI, MoTransp, MoA, MoEMR, MoMPT, MoH, NADFC, MoHA, Provincial Gov't, Regency Gov't, City Gov't		
5. Formulating and promulgating legislation and policies for PCBs management including the incentive mechanisms to support the elimination of PCBs	1. Regulatory instruments (i.e. PCB Official Guideline) which comply with the requirements of the Stockholm Convention on PCBs (Annex A, Part II), is adopted 2. Incentive mechanism that supports the environmentally sound disposal of equipment and PCBs waste is approved and implemented.	MoE, UNIDO, relevant stakeholders -Source of funds: MoE, relevant stakeholders, GEF through UNIDO	PCB management regulations are in the process of being established	
6. Review of road map formulation on implementation guidelines and technical guidelines for POPs management at various ministries and relevant non-ministerial government agencies	Road map and list of implementation guidelines and technical instruction on POPs management in Indonesia.	MoE, MoI, MoTransp, MoA, MoEMR, MoMPT, MoH, NADFC, MoHA, Provincial Gov't, Regency Gov't, City Gov't	Not yet done	

2014 NIP Action Plan	Performance Indicators	2014 NIP Stakeholder	Status of Achievement / existing condition	Year of Achievement
7. Review of the formulation of POPs quality standards for environmental protection and human health and safety protection in various ministries and relevant non-ministerial government agencies	POPs quality standard formulation reports for environmental protection, labor protection, and public health protection, is available	MoE, MoEMR, MoA, Mol, MoH, NADFC, MoT, MoF, MoMPT		
Institutional strengthening and capacity building				
1. Establishment of the Hazardous Substances Commission in accordance with the mandate of Government Regulation Number 74 of 2001	The Committee of Hazardous Substances is established and inaugurated by the President of the Republic of Indonesia.	MoE	Hazardous Substances Commission has not been formed. The formation of the Hazardous Substances Commission or a similar working team is still waiting for the results of the process of preparing the Draft of Government Regulation on Hazardous Substances Management.	
2. Review establishment of institutions for managing hazardous substances as well as hazardous waste related to the three conventions mentioned above (Basel, Stockholm and Rotterdam).	Repts of review and recommendation on hazardous substances and hazardous waste integrated management institutions in Indonesia, is available	MoE, MoSS, MoHA, NDPD, MoTransp, Mol, MoEMR, MoH, MoMPT, MoF, NADFC	Not yet done	
3. Establishment of one POPs analysis laboratory in each of Indonesia regions (West, Central, East)	The establishment and operation of three POPs laboratories in each region of Indonesia , is operated	MoE, MoA, MoA, MoEMR, Mol, MoTransp, MoMPT, MoF, NSA, NAC		

2014 NIP Action Plan	Performance Indicators	2014 NIP Stakeholder	Status of Achievement / existing condition	Year of Achievement
4. Annual workshop for the formulation of a detailed annual plan for the implementation of NIP POPs in Indonesia which is coordinated by the focal point and attended by all relevant stakeholders, including a workshop on evaluation of its implementation.	NIP POPs annual plan is agreed upon and supported by relevant stakeholders	MoE, MoA, MoEMR, Mol, MoTransp, MoMPT, MoF, NSA, NADFC, AAAT, NGO, University, other stakeholder	Coordination meetings are held annually	2015-2019
5. Establishment of a knowledge management center for NIP POPs in Indonesia. The knowledge management includes: knowledge acquisition, knowledge storage, knowledge processing, knowledge dissemination, and knowledge exchange.	NIP POPs Knowledge Management Center in Indonesia is formalized and put into operation.	MoE, MoA, MoEMR, Mol, MoTransp, MoMPT, MoF, NSA, NADFC, AAAT, NGO, University, other stakeholder	KLHK: Hazardous substances and POPs Information System has been established	2016
6. Capacity building related to POPs for human resources in the (central) government, provincial governments, district / city governments, POPs users, communities, and other relevant stakeholders.	Medium term (5 year) and annual capacity development plans, is available and training of 1,000 POPs stakeholders at the central and district / city / provincial levels, is carried out Capacity building needs for government agencies, are reviewed / identified.	MoE, MoA, MoEMR, Mol, MoTransp, MoMPT, MoF, NSA, NADFC, AAAT, NGO, University, other stakeholder	KLHK 1. Socialization of POPs management policies to local governments 2. Capacity building for central government officials (in collaboration with KEMI Sweden) 3. An International Capacity Building Workshop on POPs Analysis has been carried out 4. Media e-Learning of the Stockholm Convention through the Hazardous substances Convention Headquarters portal	1. 2016, 2017 2. 2018, 2019 3. 2019 4. 2019

2014 NIP Action Plan	Performance Indicators	2014 NIP Stakeholder	Status of Achievement / existing condition	Year of Achievement
	A number of training to meet the needs for capacity building plan, is done successfully			
7. Organizing an annual national conference on management, achievement and evaluation of implementation NIP POPs in Indonesia involve stakeholders relevant interests.	The implementation and publication of the proceedings national conference on NIP POPs management in Indonesia, is held	MoE, MoA, MoEMR, Mol, MoTransp, MoMPT, MoF, NSA, NADFC, AAAT, NGO, University, other stakeholder	Not yet done. Regular coordination meetings are held every year	
8. Publishing cross-sectoral and cross-stakeholder annual reports on the achievement of NIP POPs in Indonesia.	Issuance of annual reports across sectors and stakeholders regarding the management of NIP POPs in Indonesia, is available	MoE, MoA, MoEMR, Mol, MoTransp, MoMPT, MoF, NSA, NADFC, AAAT, NGO, University, other stakeholder	KLHK: Submission of electronic reporting to the secretariat every 2 years, publicly accessible via the Stockholm Convention website	2015, 2018
Measures to reduce or eliminate releases from intentional production and use				
Prohibition and / or elimination of the production and use of chemicals listed in Annex A and limitation of production and use of chemicals listed in Annex B				
1. Pesticides (original and new pesticides) Ensure all POPs Pesticides are regulated in regulations and strengthen compliance and monitoring of the implementation of existing regulations relating to pesticides	The POPs Pesticide life cycle is set up in the laws and regulations	MoA, MoE, universities	It has been included in Ministry Regulation of Agriculture Number 43 of 2019 and Government Regulation Number 74 of 2001	
2. PCBs Establish a policy and regulatory framework for PCBs	1. The concept of standard operating procedures equipment containing PCBs including capacitors and electric		KLHK: 1. A draft standard operating procedure for equipment containing PCBs is	

2014 NIP Action Plan	Performance Indicators	2014 NIP Stakeholder	Status of Achievement / existing condition	Year of Achievement
management, such as labeling and technical guidelines	power transformers, is available. 2. The policy draft of PCBs Disposal in electrical equipment and their intensive mechanisms, is available 3. The draft of ministerial regulation on PCBs management and contaminants in electrical equipment, is available		available, including capacitors and power transformers 2. There is a concept of PCBs elimination policy (PCBs Disposal) on electricity equipment and its intensive mechanism 3. There is a draft ministerial regulation on the management of PCBs and contaminants in electrical equipment	
3. POPs-PBDES Strengthening existing regulations to ensure the regulation and management of POPs-PBDES in their entire life cycle including prohibition and deletion production and use under the bonds of the Stockholm Convention	POPs- PBDEs are included in the government's regulations on hazardous substances, as articles that are prohibited and eliminated from their production and use		MoEF: It has been included in the hazardous substance list regulated in the Draft of Government Regulation on Hazardous Substances Management	2018
4. PFOS Strengthening existing regulations to ensure the regulation and management of PFOS in all its life cycles including prohibition and elimination of its production and use under bonds from the Stockholm Convention	Management of PFOS and the materials associated with it included in the Government Regulation on hazardous substances		MoEF: It has been included in the hazardous substance list regulated in the Draft of Government Regulation on Hazardous Substances Management	2018

2014 NIP Action Plan	Performance Indicators	2014 NIP Stakeholder	Status of Achievement / existing condition	Year of Achievement
Imports of chemicals listed in Annex A and Annex B				
1. Pesticides (original and new) Ensure the life cycle of all pesticide POPs is regulated and managed in accordance with Stockholm Convention's obligations, including the import ban on lindane	1. The life cycle of POPs pesticides is regulated and managed, and the technical guidelines for import control and prevention, available 2. National monitoring data are collected 3. of monitoring data using international standards, available		MoEF: POPs pesticides, including hazardous substance, are prohibited from being used	2018
2. PCBs Make a study of the formulation of a road map (road map) implementation instructions for and technical guidelines for PCBs management through the preparation of SNI for electric power equipment that does not contain PCBs	The national standard for PCBs-free insulation oil for electric power equipment, is available.	MoEF, MoEMR	Currently, the action plan is no longer relevant to current conditions, but its use in Indonesia is in accordance with SNI IEC	
3. PFOS Assessment of the presence of PFOS and the impact before the development of the relevant regulations.	Data on the existence of PFOS and materials associated with it in all related sectors, is available.	MoEF, Mol, MoT, MoH, Customs and Excise, AAAT, IIS, University, NGO, ICCI, and relevant sector.	MoEF: An initial / preliminary inventory of the existence of PFOS has been carried out LIPI: There is no research related to PFOS	2018-2019
Exports of chemicals listed in Annex A and Annex B				
1. Pesticides (original and new) Ensure the life cycle of all pesticide POPs is regulated and managed in accordance with	POPs pesticide life cycle is regulated and managed		Ministry of Trade: Not yet regulated in Ministry of Trade regulations	

2014 NIP Action Plan	Performance Indicators	2014 NIP Stakeholder	Status of Achievement / existing condition	Year of Achievement
Stockholm Convention bonds, including export bans				
2. PCBs There is no production of PCBs in Indonesia, so there is no export abroad.	There is no plan of action		Ministry of Trade: Not yet regulated in the Ministry of Trade regulations	
3. POP-PBDEs (tetra-BDE, penta-BDE, hexa-BDE and heptaBDE) Strengthening existing regulations to ensure the regulation and management of PBDEs in all their life cycles including the proper export ban and elimination bonds from the Stockholm Convention	POP-PBDEs are included in government regulations on hazardous waste which must be banned and eliminated from export.		Ministry of Trade: Not yet regulated in the Ministry of Trade regulations	
4. PFOS No action plan (No production and export)	There is no plan of action			
Register of specific exemptions and the continuing need of exemptions				
1. The government will not apply for an exempt registration for the use of POPs and take regulatory measures for a total ban on the use of these chemicals			MoEF: Until 2019, Indonesia was not included in the register (register) of countries that submitted exemptions	
Measures to reduce releases from unintentional production				
1. Strengthening the capacity of the laboratory to take measurements UPOPs (PCDDs/Fs, PCB, HCB, PeCB)	The national laboratory is capable of doing sampling and analysis of UPOPs (PCDD/PCDF, PCB, HCB, PeCB).			

2014 NIP Action Plan	Performance Indicators	2014 NIP Stakeholder	Status of Achievement / existing condition	Year of Achievement
2. Inventory and assessment of UPOPs (PCDDs/Fs, PCBs, HCB, PeCB)	Inventory database and study on releases of UPOPs, are available	MoEF, Mol, MoFor, MoA, MoEMR, CFEPC		
3. Introducing BAT and BEP to the waste incineration sector	BAT / BEP guidelines and instructions for waste incinerators, is available. BAT and BEP demonstrations in waste incineration, is implemented.	MoEF, UNIDO, Mol, related stakeholder		
4. Introducing BAT and BEP to the metal industry sector	BAT / BEP guidelines and instructions for the metal industry, is available. The BAT and BEP demonstrations in the metal industry sector, is implemented.	MoEF, UNIDO, Mol, related stakeholder		
Identification of stockpiles, articles in use and waste				
1. Pesticides (original and new) Carry out a stockpile inventory at the retailer	1. Database of POPs pesticide monitoring results in various environmental media, is available 2. Instructions on POPs stockpiles management, is available 3. Instruction on storage and safe stockpiling, is available	MoA, MoEF	Not yet done	

2014 NIP Action Plan	Performance Indicators	2014 NIP Stakeholder	Status of Achievement / existing condition	Year of Achievement
2. Continuously monitoring the presence of POPs pesticides, export / import and their presence in the environment	<ol style="list-style-type: none"> 1. IPM and IVM in accordance with environmentally sound management, is implemented. 2. Instructions on storage and safe stockpiling, is provided 	MoA, MoH	Not yet available instructions for safe storage and stockpiling are available	
3. PCBs Develop programs and conduct national inventories and monitoring for PCBs	A comprehensive inventory database of PCBs from various sectors to identify stockpiles of PCBs, PCBs in use and waste PCBs, is available	MoEF, MoEMR + SEE, Mol, MoTransp, MoEC, MoF, Local Gov't, IIS, AAAT	There is a database available but not yet integrated	
4. POP-PBDEs (Tetra-BDE, Penta-BDE, Hexa-BDE and Hepta-BDE) Developing a more detailed and comprehensive inventory of POP-PBDEs compounds and products / equipment containing PBDEs (transportation, electricity and electronics, and other polymeric materials), as well as improving infrastructure and human resource capacity for PBDEs analysis	<ol style="list-style-type: none"> 1. A comprehensive inventory of POP-PBDEs from various activity sectors is obtained 2. of human resources and laboratory infrastructure to assess and analyze POP-PBDEs, is available 	MoEF, Mol, MoT, MoTransp, SI, AAAT, IIS, NGO, university, association, industry, and other stakeholder	<p>IIS: In collaboration with Nexus3 / Balifokus and Hasanudin Universities for analysis of BDE as a marker for microplastic samples in Indonesian waters (South Java coast)</p> <p>◇ Chemical structure analysis using FTIR and development of analytical methods using GCMS</p>	2018-present
5. PFOS Continue the PFOS inventory in a comprehensive manner	Data on articles and material stockpiles from PFOS, and waste containing PFOS, is provided	MoEF, Mol, MoT, DGCE, AAAT, IIS, university, NGO, ICCI, and relevant sector.	IIS: There is no related research	

2014 NIP Action Plan	Performance Indicators	2014 NIP Stakeholder	Status of Achievement / existing condition	Year of Achievement
Stockpiles management and appropriate measures for handling and disposal of articles in use				
1. Pesticides Management of pesticide stockpiles and appropriate measures to handle the stockpiles and disposal of pesticide waste	1. Guidelines for POPs stockpile management, is provided. 2. Instructions on POPs manage, storage and disposal, is available	MoEF, MoA	Guidelines for POPs stockpile management and management for POPs storage and disposal are not yet available	
2. PCBs Implementation of environmentally sound management for waste PCBs and equipment containing PCBs	Environmentally sound management of 3,000 tons of PCBs waste and equipment contaminated by PCBs, is implemented.	MoEF, UNIDO, MoEMR+SEE, Mol, AAAT, related stakeholder	Inventory and labeling have been carried out but disposal management has not been carried out	
3. POP-PBDEs (Tetra-BDE, Penta-BDE, Hexa-BDE and HeptaBDE) Develop an environmentally sound management system for products / equipment containing PBDEs	Environmental management for products / equipment containing POP-PBDE within the BAT / BEP framework, is carried out	MoEF, Mol, MoTransp, MoLHR, MoH, MoRT, MoCI, TVRI, IIS, AAAT, university, NGO, Local Gov't, industry.		
4. POPs waste management in electrical and electronic equipment (WEEE) which is environmentally friendly	The practices of environmentally sound management of POPs PBDEs to waste electrical and electronic equipment, is applied	MoEF, Mol, MoT, DGCE, industrial association, recycling companies, private sector, academia and other stakeholders		
5. PFOS Use of the best available techniques and best environmental practices regarding the disposal technology of waste containing PFOS in industries using PFOS	waste disposal technology containing PFOS, is available	MoEF, Mol, MoT, DGCE, AAAT, IIS, University, NGO, ICCI, and relevant sector.		

2014 NIP Action Plan	Performance Indicators	2014 NIP Stakeholder	Status of Achievement / existing condition	Year of Achievement
Identification of contaminated sites (Annex A, B, and C of Chemicals)			and environmentally sound remediation	
1. Pesticides (original and new) Carry out a complete inventory to identify and verify contaminated sites	An accurate inventory data to identify and verify the contaminated sites, where: 1. Residue level of DDT, is measured 2. Contaminated site is restored 3. Inventory data of HCB is available	Mol, MoEF, MoH, MoA*	Balingtan-Ministry of Agriculture, related to the prevention and reduction of POPs pesticide residues, has created 2 (two) products, namely: 1. Filter (filter inlet outlet) to capture organochlorine compounds including pesticide POPs in irrigation canals. This filter tool has been patented with IDS number 000001383 2. Urea coated with activated charcoal, enriched with consortium microbes. The urea fertilizer is able to degrade organochlorine residues (POPs). The product has been patented with IDP000042773 number	May 25, 2015 September 26, 2016
2. PCBs dan PCDDs/Fs Monitoring in the environment around the location with high POP and UPOP concentrations	Data on PCBs and PCDDs / Fs concentrations in the reference area of the inventory activities with potential contamination of PCBs and PCDDs / Fs, is available.	MoEF, Mol, CFEPC, MoEMR+SEE		
3. POP-PBDEs (Tetra-BDE, Penta-BDE, Hexa-BDE and Hepta-BDE) Development of methods for evaluating contaminated sites according to current conditions	1. Methods for the assessment of contaminated sites and potential health and environmental impacts of POP-PBDEs, is compiled	MoEF, MoH, IIS, AAAT, University, NGO	IIS: In collaboration with Nexus3 / Balifokus and Hasanudin Universities for BDE analysis as a marker for microplastic samples in Indonesian waters (Coastal South Java sea)	

2014 NIP Action Plan	Performance Indicators	2014 NIP Stakeholder	Status of Achievement / existing condition	Year of Achievement
and potential negative impacts on the environment and health	2. comprehensive inventory data of various use sectors, is compiled, and 3. study of contaminated sites with POP-PBDEs from e-waste and vehicle activities, is carried out			
4. POP-PBDEs (Tetra-BDE, Penta-BDE, Hexa-BDE and Hepta-BDE) Conduct a more detailed re-inventory of potential locations contaminated by PBDEs in relation to electronic waste and motor vehicle waste activities	1. A comprehensive inventory data of various sectors of use, is available 2. POP-PBDEs contamination study in e-waste and vehicles, is carried out	MoEF, Mol, recycling companies, private sector, and other stakeholders		
5. PFOS Investigation into areas potentially contaminated with PFOS and related materials	Data on contaminated areas with PFOS and related materials there to, is available	MoEF, Mol, MoT, MoH, DGCE, AAAT, IIS, University, NGO, ICCI, and relevant sector.	IIS: There is no related research	
Facilitating or conducting information exchange and stakeholder involvement				
1. Continue to share information with other countries and respond to requests for information from these countries and from the Secretariat.	Regularly information exchange between the countries, is carried out	MoEF as National Focal Point and National Contact Point	MoEF: - Information exchange with countries, either directly or through the Secretariat, is intensively carried out. - Periodic reports can be accessed by every stakeholder through the BRS Convention website	2015 - 2019
Public awareness, information and education				

2014 NIP Action Plan	Performance Indicators	2014 NIP Stakeholder	Status of Achievement / existing condition	Year of Achievement
1. Establish information / communication systems and mechanisms for all aspects of POPs for various target groups	Communication / information systems and mechanisms on POPs to various target groups, is established	MoEF, Mol, MoCI, MoH, AAAT, IIS, MoEC, university, NGO, industrial and trade associations, related stakeholder.	MoEF: Hazardous substances and POPs Information Systems have been established Ministry of Agriculture: Pesticides Information System (SIP) has been established	2016 2007
2. Conduct education and awareness activities to ensure individuals and communities receive the necessary information to assist informed decision-making in dealing with POPs issues.	The road map is formulated, and the implementation is carried out	MoEF, Mol, MoCI, MoH, AAAT, IIS, MoEC, university, NGO, , industrial and trade associations, related stakeholder.	Delivery of information about POPs materials through various communication and socialization media IIS: Support MoEF in the POPs (Paraquat) roadmap in terms of literature review	2017, 2018, 2019
3. Raising public awareness of issues related to PCBs	<ol style="list-style-type: none"> 1. A number of related parties participated in awareness raising activities. 2. The materials of increasing awareness, available. 3. A number of awareness raising activities run well. 4. results from a questionnaire survey regarding the impact of increasing the awareness activities, is provided. 	<p>MoEF, Mol, AAAT, MoEMR+SEE, related stakeholder**</p> <p>** Source of funds: MoEF, related stakeholder, GEF through UNIDO</p>		

2014 NIP Action Plan	Performance Indicators	2014 NIP Stakeholder	Status of Achievement / existing condition	Year of Achievement
Reporting				
1. Commit to sending national reports to the Secretariat	A periodically national report to the Secretariat, is carried out	MoEF	Submission of electronic reporting to the secretariat every 2 years, publicly accessible via the Stockholm Convention website	2015, 2018
Research, development and monitoring (Article 11)				
1. Conduct studies, research and monitoring as well as the effects of POPs exposure on public health and the environment	A national monitoring program and impact assessment for POPs, is initiated	MoH, MoEC, University, MoRT (AAAT, IIS), MoEF (CFEPC), MoI, MoA*	Ministry of Agriculture: The results of studies, research and monitoring are presented in the form of pollution delineation maps and seminars as well as national and international publications	2007-present
Technical and financial assistance				
1. Develop and submit a proposal to the Stockholm Convention Secretariat and / or relevant donors.	Proposals are submitted to the donors	MoEF, MoI, MoA* and other institution	The Global Monitoring Project on POPs is being implemented (PCB project at MoEF; PBDE project at Ministry of Industry, textile sector POPs project at MoEF)	GMP POPs 2017 - 2021

* Addition of the Ministry of NIP POPs 2014

IV. STRATEGY AND ACTION PLAN ON POPs MANAGEMENT

4.1. Policy Statement

The 1945 Constitution of the Republic of Indonesia has stated that a good and healthy environment is a human right and a constitutional rights for every Indonesian citizens. To make it happen, Indonesia has enacted Law Number 32 of 2009 on Environmental Protection and Management. For the protection to the citizens related to the pollution of POPs compounds, the government of the Republic of Indonesia and the House of Representatives/DPR have ratified the Stockholm Convention as outlined in Law Number 19 of 2009 on Ratification of the Stockholm Convention On Persistent Organic Pollutants (Stockholm Convention on Persistent Organic Pollutants).

Indonesia has regulated the hazardous waste management since 1994 and the hazardous substances management since 2001. In 2014, the Government Regulation on Hazardous Waste Management was revised and amended through the Government Regulation Number 101 of 2014 on Hazardous Waste Management (This regulations have been amended by Government Regulation Number 22 of 2021). Currently the Indonesian government through the Ministry of Environment and Forestry is in the final stage of revising the Government Regulation on Hazardous Substances Management. One of the special aspects regulated in such revision is, the inclusion of chemicals in the Stockholm Convention into the hazardous substances arrangement.

Based on the 2020-2024 National Medium-Term Development Plan/RPJMN, the strategy for realizing the Policy Direction for Improving Environmental Quality in the 2020-2024 RPJMN includes:

- a. Prevention of Pollution and Damage of Natural Resources and the Environment;
- b. Countermeasures of Pollution and Damage of Natural Resources and the Environment;
- c. Recovery of Pollution and Damage of Natural Resources and the Environment; and
- d. Institutional Strengthening and Law Enforcement in the Field of Natural Resources and the Environment.

4.2. Strategy of Implementation

4.2.1. Institutional Initiatives

The Indonesian government uses NIP POPs as a reference for planning and implementing of the Stockholm Convention's implementation policies. The Ministry of Environment and Forestry as the National Focal Point for the Stockholm Convention in Indonesia is tasked to facilitate the exchange of information concerning efforts on reducing or eliminating POPs from the production, use or release of POPs, POPs alternative substitutes material, including information related to monitoring results, their impact and implications to economic and social costs. Other ministries and institutions apply the implementing policies to the Stockholm Convention in accordance with their duties and functions.

The implementation of the Stockholm Convention requires coordination between government agencies in order to be effective and efficient. One of the strategies to strengthen coordination in the implementation of NIP POPs is through the establishment NIP POPs Committee. The NIP POPs Committee serves as a forum to coordinate and evaluate the application of the Stockholm Convention. The committee consists of ministries / related institutions, by involving relevant stakeholders, especially experts, universities, business actors, NGOs and society in general. The committee has duties including:

- a. coordinate planning and formulation of POPs material management policies;
- b. monitor the implementation of POPs material management policies;
- c. periodically evaluating the application of the Stockholm Convention; and
- d. conduct regular reviews and updates to the NIP POPs.

4.3. Action Plan

The action plan for implementing the Stockholm Convention is determined by taking into account the priority of activities. The priority is determined based on the implementation status of NIP POPs in 2014, POPs data inventory, and current policies. The action plan for implementing the Stockholm Convention covers:

- a. regulations strengthening;
- b. institutional strengthening and capacity building;

- c. measures to reduce or eliminate releases from intentional production and use;
- d. register of specific exemptions or acceptable purposes;
- e. measures to reduce releases from unintentional production;
- f. identification of stockpiles, articles in use and waste;
- g. stockpiles management and appropriate measures for handling and disposal of articles in use;
- h. identification of contaminated sites (Annex A, Annex B and Annex C of Chemicals) and environmentally sound remediation;
- i. information exchange and stakeholders involvement;
- j. public awareness, information and education;
- k. reporting;
- l. research, development and monitoring; and
- m. technical and financial assistance.

4.3.1. Regulations Strengthening

According to the evaluation results of the implementation of NIP POPs 2014, there are several action plans of strengthen regulations that are still on progress. In connection with the results of the inventory data and developments of the Stockholm Convention, the relevant activities to become an action plan are presented in Table 4.1.

In connection with the results of the data inventory and developments in the Stockholm Convention, the relevant activities to become an action plan are presented in Table 4.1, as follows:

Table 4.1 Action Plan for Strengthening Regulations

No	Acrtion Plan	Performance Indicator	Executing Agencies
1	Evaluate the laws and regulations related to the Stockholm Convention.	The result of a review of the laws and regulations related to the Stockholm Convention, is compiled.	MoEF, MoA, MoI, MoF, MoT
2	Review the effectiveness of the enforcement of laws and regulations related to the arrangement and management of the Stockholm Convention on POPs	The results study on the effectiveness of the enforcement of laws and regulations related to the arrangement and management of the Stockholm Convention on POPs, is compiled	MoEF, MoA, MoI, MoF, MoT

No	Action Plan	Performance Indicator	Executing Agencies
3	Ensure all POPs compounds in the Stockholm Convention are arranged in the regulations on Hazardous Substances Management	The Government Regulation on Hazardous Substances Management, contains POPs compounds in the Stockholm Convention, is stipulated.	MoEF, MoA, Mol, MoF, MoT
4	Review the need on regulatory / policy related to the arrangement and management of the Stockholm Convention on POPs	The results of a review on the need of regulatory / policy related to the regulation and management of POPs in the Stockholm Convention, is compiled.	MoEF, MoA, Mol, MoF, MoT
5	Review the formulation of POPs quality standards for environmental protection and health protection and human safety	The results of a review on the formulation of POPs quality standards for environmental protection and health protection human safety, is compiled.	MoEF, MoH, MoRT/ Kemenristek/NRIA, IIS

4.3.2. Institutional Strengthening and Capacity Building

The application of the Stockholm Convention is task and function of various stakeholders, namely the government, business actors, academics and NGOs. The coordination between stakeholders requires a forum in the form of a committee. The establishment of committee for the previous NIP POPs have not carried out yet to become a priority in NIP POPs.

The understanding of the implementation of the Stockholm Convention needs to be improved, due to the changes in the responsibilities of stakeholder organizations. Therefore, capacity building for stakeholders is one of the action plan that will be carried out in the near future (Table 4.2). Such capacity building is organized in the form of workshops or webinars which will be hold regularly. In addition, it is hoped that the establishment of a knowledge management center will accelerate the implementation of the Convention.

Table 4.2 Action Plan for Institutional Strengthening and Capacity Building Efforts

No	Action Plan	Performance Indicators	M /I Executing Agencies
1	Establish POPs National Committee	The National Committee of POPs, is determined.	MoEF, MoA, Mol, MoT, MoH, MoRT/NRIA, IIS, AAAT, NADFC
2	Organizing an annual workshop on the formulation of a detailed annual plan for the implementation of NIP POPs in Indonesia, which is coordinated	An annual workshop on the formulation of a detailed annual plan for the implementation of NIP POPs, is held.	MoEF, MoA, Mol, MoT, MoF.

No	Action Plan	Performance Indicators	M /I Executing Agencies
	by the focal point and attended by all relevant stakeholders, including a workshop on evaluation of its implementation.		
3	Strengthen the knowledge management system on POPs in Indonesia which includes: acquisition, storage, processing, dissemination and exchange of knowledge	The use of knowledge management systems on POPs in Indonesia, both in terms of content and the users, is increased.	MoEF, MoA, MoRT/NRIA, IIS, AAAT
4	Develop the human resources capacity in the central government, provincial governments, district / city governments, POPs users, communities, and other relevant stakeholders.	Capacity development on POPs at least once a year, is carried out	MoEF, MoA, MoI, MoT, MoF.

4.3.3. Measures to Reduce or Eliminate Releases from Intentional Production and its Use

➤ POPs-Pesticides

All POPs pesticides have been banned from being used as pesticides through the Ministerial Regulation of Agriculture Number 43 of 2019 on Pesticide Registration. The use of nine POPs pesticides (aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, mirex, toxaphene, and hexachlorobenzene) has been banned by the government through Government Regulation Number 74 of 2001 on Hazardous Substances Management. However, the new POPs pesticides have not been included and have not been regulated in this Government Regulation. The use of Lindane in Government Regulation Number 74 of 2001 on Hazardous Substances Management is included in the category of limited use, so that the use of Lindane in flea-killing products is still being found. According to the results of the search, the import was still found of the new POPs pesticides, such as chlordecone, endosulfan, lindane, pentachlorophenol and dicofol. Therefore, further strengthening regulatory measures are needed to limit / ban the production, use, import, sale, stock and waste from POPs Pesticides.

➤ PCBs

The inventory shows that the PCBs found came from products containing POPs. Currently, it is in the process of drafting a technical regulation for managing PCBs. Activities that will be carried out are in the form of regulatory strengthening measures, through formulating and ratifying the laws and regulations and policies for the management of PCBs, and then limiting / banning the production, use, import, sale, stock and waste of PCBs. This action plan has been included in the action plan for strengthening regulations.

➤ HCB

There is no HCB production and export in Indonesia. However, HCB has the potential to enter Indonesia through imports of products containing POPs. Currently, the available regulations regarding HCBs are contained in the regulations on hazardous waste management and contaminated sites recovery.

An assessment of the regulatory / policy requirements related to the arrangement and management of HCBs is needed to ensure that their arrangement and management, including the prohibition and elimination of their production and use, are in line with the Convention's obligation. This action plan has been included in the action plan for strengthening regulations.

➤ PCNs

There is no PCNs production data were found in Indonesia. PCNs have also not been defined in the Indonesian Customs Tariff Book, so the existence and number of imports and exports of PCNs is difficult to identify. The regulations related to PCNs have not been specifically regulated, they only exist for naphthalene chemicals and their derivatives related to hazardous waste management.

An assessment of regulatory / policy requirements related to the arrangement and management of POPs PCNs is required, as well as a need assessment for the determination of PCNs in the Indonesian Customs Tariff Book to ensure the arrangement and management of HCB, including the prohibition and elimination of production and its use in accordance with

the Convention's obligation. This action plan has been included in the action plan for strengthening regulations.

➤ SCCPs

There has not been any strengthening of regulations related to SCCP for the prohibition and / or elimination of production and its use. The number of imports of SCCP to Indonesia has not been specifically found, although the import data for Chlorinated Paraffin (CP) chemicals are generally available.

An assessment of regulatory / policy requirements related to the arrangement and management of POPs SCCP is needed to ensure the arrangement and management of HCB, including prohibition and elimination of the production and its use in line with the Convention's obligations. This action plan has been included in the action plan for strengthening regulations.

➤ PCP

The total PCP export and import data were available, and the PCP chemicals were found in river water. There have been many strengthening regulations related to PCPs. An assessment of regulatory / policy requirements related to the arrangement and management of PCPs is required to ensure that their arrangement and management, including prohibition and elimination of the production and its use in line with the Convention's obligations.

➤ POP-PBDEs, HBB, and HBCD

Commercial PBDEs (POP-BDEs), HBB, and HBCD are not produced in Indonesia, but the environmental monitoring results indicate their use in Indonesia. The presence of traces of PBDEs, HBB, and HBCD is likely from products containing POP. Currently there are no regulations on the production and PBDEs use in Indonesia. Therefore, the activities that will be carried out are in the form of further strengthening regulatory measures to limit / prohibit the production, use, import, sale, stockpiling, and waste of PBDEs formulations (Penta-BDE

and Octa-BDE). This action plan has been included in the action plan for strengthening regulations.

➤ PFOS, its salts and PFOSF

There is no industry that produces PFOS and article related to PFOS in Indonesia. However, PFOS and related article were found in sediments in Jakarta Bay, skipjack tuna liver in Indonesian waters, and breast milk in district of Purwakarta. This may be due to the import and the use of PFOS chemicals and / or products containing PFOS. Currently, there are no regulations regarding the production and use of PFOS in Indonesia. The strengthening of regulation is to ensure the arrangement and management of PFOS in all its life cycles including the prohibition and elimination of production and use in line with the Convention's obligation. This action plan has been included in the action plan for strengthening regulations.

Table 4.3 Action Plan of Measures to Reduce or Eliminate Releases from Intentional Production and its Use

No	Action Plan	Performance Indicators	Executing Agencies
1	Set up the life cycle of all POPs Pesticides in line with obligations of the Stockholm Convention, including import and export arrangements.	POPs pesticide life cycle arrangements in line with the Stockholm Convention's obligation, including import and export arrangements, is issued	MoA, MoEF, MoF, MoT, Mol.
2	Monitor the activities indicated using or producing or releasing the POPs compounds	Activities indicated using or producing or releasing POPs compounds, are monitored.	MoA, MoEF, Mol
3	Set up the list of POPs articles into the annex of the ministerial regulation in charge of the trade sector that regulates articles that are prohibited from import	A ministerial regulation in charge of the trade sector which accommodates a list of prohibited imports, is issued	MoA, MoEF, MoF, MoT, Mol

4.3.4. Registration for Specific Exemptions / Acceptable Purpose

Indonesia is not in the status of registering for specific exemptions related to the production and use of POPs. Registration for specific exemptions will be made after reviewing an assessment of the status and production / use requirements of POPs listed with specific

exemptions / acceptable purposes. A study will be carried out on the new POPs regulated in the Convention. The review will assess the status, production, use as well as will assess the impact of registration or deregistration for a special exemption / acceptable purpose. The results of the study may be in the form of registration for specific exemptions / acceptable purposes. The action plan for registration of specific exemptions or acceptable purposes is shown in Table 4.4.

Table 4.4 Action Plan of Registration for Specific exemptions / Acceptable Purpose

No	Action Plan	Performance Indicator	Executing Agencies
1	Review and assess the status and need for production / use of POPs that are registered with specific exemptions / acceptable purposes, to be considered for registration to the Secretariat of the Convention.	The assessment of status and production needs / use of registered POPs with specific exemptions / acceptable purposes, is compiled.	MoA, MoEF, MoF, MoT, MoI, MoRT/NRIA, IIS.

4.3.5. Measures to Reduce Releases from Unintentional Product

PCDD and PCDF (collectively referred to as PCDD / PCDF) have never been used as a commercial product nor created for any reason other than for laboratory purposes. The PCB, HCB, and PeCBz were formed unintentional, usually generate from the same source that produced the PCDD / PCDF. Unlike PCDD / PCDF, these 3 POPs materials have been produced and used for specific purposes, their production and use is much higher than their unintentionally formations and releases (Ministry of Environment, 2014). The assessment of PCDD / PCDF compounds requires a fairly high budget, considering that its concentration is very low in the atmosphere so that it requires an accurate laboratory equipment. Therefore, activity on UPOPs inventory should be focused on PCDD / PCDF, as this substance inventory can indicate the presence of other UPOPs.

Table 4.5 Action Plan of Measures to Reduce Releases from Unintentional Product

No	Action Plan	Performance Indicator	Executing Agencies
1	Strengthen laboratory capacity to perform UPOPs measurements (PCDDs / Fs, PCB, HCB, PeCB)	The capability of national laboratories capacity of sampling and analyzing UPOPs	MoEF, MoRT/NRIA, IIS, MoA

No	Action Plan	Performance Indicator	Executing Agencies
		(PCDD / PCDF, PCB, HCB, PeCB), is strengthened	
2	Inventory and review the UPOPs (PCDDs / Fs, PCBs, HCB, PeCB)	Databases on UPOPs inventory and release assessment, is available	MoEF, MoRT/NRIA, IIS, MoA, Mol, MoH.
3	Introducing BAT and BEP to the waste and solid waste incineration sector	<ul style="list-style-type: none"> BAT / BEP guidelines and handbook for waste and solid waste incinerators, is available BAT and BEP demonstrations on waste and solid waste incineration, is implemented. 	MoEF, MoRT/NRIA, AAAT
4	Introducing BAT and BEP to the metal industry sector	<ul style="list-style-type: none"> BAT / BEP guidelines and handbook for the metal industry, is available BAT and BEP demonstrations in the metal industry sector, is implemented. 	Mol, MoEF, MoRT/NRIA, AAAT
5	Monitoring the activities indicated release of UPOPs compounds	Monitoring of activities indicated release UPOPs compounds, is implemented.	MoEF, MoA, Mol

4.3.6. Identification of Stockpiles, Articles in Use and their Waste

➤ POPs Pesticide

With respect to the inventory data, currently there are no production and export of POPs pesticides, either for initial POPs pesticides or new POPs pesticides. Inventory data also reveals that there are no initial imports of POPs pesticides. However, there are still new POPs pesticide imports, namely chlordecone, endosulfan, lindane, pentachlorophenol, and dicofol. Therefore, an unknown amount of stockpiles can still be found in the field. Furthermore, it is necessary to have an inventory to determine the amount and volume of POPs pesticide stockpiles.

Stockpiles of POPs pesticides are still found in products / articles sold in the market and the inventory results show that there are still imports of POPs pesticides. POPs pesticide stockpiles need to be managed in an environmentally sound manner to prevent POPs compounds from polluting the environment and having an impact on human health.

➤ PCBs

PCBs have never been produced in Indonesia and there is no information on exports and stockpiles of these compounds. The last import activity of articles containing PCBs was recorded in 2016. From the results of the 2016 inventory data, PCBs were found mostly in transformer oil samples. PCBs were found in transformer oil samples from the inventory results in 2016. In 2020, the 2nd stage of the advanced PCBs inventory has been carried out. The action plan that will be carried out is to develop an appropriate strategy to identify by completing this follow-up inventory more comprehensive, and develop an environmentally sound management of products / articles containing PCBs and their waste.

➤ HCBD

No data on imports, exports, and production of HCBD chemicals were found. The existence of HCBD is possible as a by-product of an industry. However, there is no inventory of HCBD-contaminated stockpiles, sites, and waste. In connection with the alleged use or production of HCBD in the product, an action plan is needed to inventory the heap and waste containing HCBD and develop environmentally sound management of products / goods containing HCBD and its waste.

➤ PCNs

PCNs have not been determined in the Indonesian Customs Tariff Book, so the existence and number of imports and exports of PCNs is difficult to identify. From the monitoring results to the 12 companies, there was no found of PCN use in companies in Indonesia. Even so, monitoring is still not comprehensive because it only covers several areas in West Java Province, West Jakarta City, Pasuruan Regency, East Java, and Batam City. The next action plan is to inventory the stockpile and waste, as well as develop an environmentally sound management of products / articles containing PCNs and their waste more thoroughly so that they can describe the actual conditions.

➤ SCCP

Inventory of sources of production, import and export of SCCP has not been carried out specifically. Inventory activities for the number of imports and products are available only for CP chemicals and are carried out in general. SCCP can be used in manufacturing as a flame retardant in rubber, or as a flame retardant and water resistance in the metal, textile, paint, building and construction industries. An action plan is needed to make an inventory of stockpiles and waste containing SCCP specifically and to develop an environmentally sound management of products / articles containing SCCP and its waste.

➤ PCP

Total PCP export and import data were available from 2009-2017. However, the production sources and products containing PCP used in the industrial sector (type of product, brand, amount of content, etc.) have not been inventoried. So an action plan is needed to inventory the stockpiles and waste containing PCP produced by the industry, as well as to develop an environmentally sound management of products / articles containing POP-PCP and its waste.

➤ POP-PBDEs, HBB, and HBCD

POP-PBDEs, HBB, and HBCD have never been produced in Indonesia and there is no information on imports and stocks of these compounds. However, because these compounds are used as additives for flame retardants in various application products, including polymers in vehicle parts and electronic and electrical equipment, they may still be stored in these application products in Indonesia. Initial inventory reports have estimated the amounts of tetra-, penta-, hexa-BDE and hepta-BDE in CRT TV / Computers and automotive from their application of use from 1975 to the most recent year, depending on the product (1975 to 2012 for CRT, and 1975- 2004 for automotive).

Considering that the last inventory carried out was in 2013, the action plan is to develop an appropriate strategy for identification by continuing a more comprehensive inventory and developing environmentally sound management of products / articles containing POP-PBDEs and their waste.

The stockpiles of PBDEs-POP are stored in used articles / products or products that have become waste, so environmental sound management is required upon the flow of products / articles containing this compound. As previously mentioned, this can be done among others by regulations strengthening on hazardous waste management to include the POP-PBDEs; institutional strengthening to develop criteria, standards and other provisions for environmentally sound management including recycling, storage and disposal activities; and raise awareness to various stakeholders and communities. Indonesia has ratified the Basel Convention on Cross-Border Control of Hazardous Wastes and their Disposal. Therefore, the action plan on such matters must be in line with this convention.

The Basel Convention defined the environmentally sound management by taking all practical steps to ensure hazardous waste and other wastes are managed in a way that protects human health and the environment against the possible side effects of such wastes. In this context, the way in which hazardous waste is managed in an environmentally sound management starts from the source through to storage, transportation, maintenance, reuse, recycling, recovery and final disposal.

➤ PFOS, its salts and PFOSF

Most industries in Indonesia are not familiar with PFOS and other materials related to PFOS. Therefore, it is difficult to estimate the exact amount of these chemicals in the form of residues, including checking their conditions and storage locations. With regard to articles that have been used and their waste, there are several sectors that are suspected of containing PFOS and related materials.

Although some industries no longer use PFOS and related materials due to international regulations, but it is still necessary to regulate the management of stockpiles and waste from these chemicals as long as these materials still exist. Considering that PFOS, its salt, and PFOSF have not been inventoried in the 2014-2020 period, it is necessary to carry out a comprehensive inventory to ensure management measures for stockpiles, articles still in use and their waste. In addition, it is necessary to develop guidelines or BAT / BET for advanced management.

Table 4.6 Action Plan of Identification of Stockpiles, Articles in Use and their Waste

No	Action Plan	Performance Indicator	Executing Agencies
1	<u>POP Pesticide</u> Inventory of stockpiles, articles still in use and POPs pesticide waste	POPs pesticide inventory reports, is available	MoEF, MoA, Mol.
2	<u>PCB</u> Inventory of stockpiles, articles in use and waste PCBs	PCBs inventory reports, is available	MoEF, MoEMR, Mol.
3	<u>POP-PBDEs, HBB, dan HBCD</u> Inventory of stockpiles, articles still in use and waste POP-PBDEs, HBB, and HBCD	POP-PBDEs, HBB, and HBCD inventory reports, is available	MoEF, Mol.
4	<u>HCB</u> Inventory of stockpiles, articles that are still in use and HCB waste	HCB inventory reports, is available	MoEF, Mol.
5	<u>PCNs</u> Inventory of stockpiles, articles in use and waste PCNs	PCNs inventory reports, is available	MoEF, Mol.
6	<u>SCCPs</u> Inventory of stockpiles, articles still in use and waste SCCPs	SCCPs inventory reports, is available	MoEF, Mol.
7	<u>PFOS, its salts, and PFOSF</u> Inventory of stockpiles, articles still in use and waste PFOS, salts, and PFOSF	PFOS, its salts and PFOSF Inventory reports, are available	MoEF, Mol.
8	<u>PCPs</u> Inventory of stockpiles, articles in use and waste PCPs	PCPs on use and waste in industry inventory reports, is available	MoEF, Mol.

4.3.7. Stockpile Management and Proper Manner of Handling and Eliminating Articles in Use

After the stockpiles and articles containing POPs have been inventoried, it is necessary to take steps to manage them. It takes good ways to handle and destroy the articles in use, through special strategies to make it more effective and efficient. The action plan of stockpile management and the best ways to deal with and destroy the articles in use are shown in Table 4.7.

Table 4.7 Action plan and performance indicators for handling and eliminating articles in Use

No	Action Plan	Performance Indicator	Executing Agencies
1	<u>POP Pesticide</u> Manage pesticide stockpiles and appropriate measures for handling the stockpile and eliminate of pesticide waste	<ul style="list-style-type: none"> Guidelines of POPs stockpile management, is available. Guidelines of POPs storage and disposal management are available 	MoA, MoEF, Mol
2	<u>PCBs</u> Prepare BAT / BEP or technical guidelines for waste or articles containing PCBs management	BAT / BEP implementation reports or technical guidelines waste management or articles containing PCBs, are available	MoEF, MoEMR, Mol, MoRT/NRIA, AAAT
3	<u>HCBd</u> Study on BAT / BEP for the elimination technology of waste or articles containing HCBd	The results study on BAT / BEP for the elimination technology of waste containing HCBd, is available	MoEF, Mol, MoRT/NRIA, AAAT
4	<u>PCNs</u> Study on BAT / BEP for elimination technology of waste or articles containing PCNs	The results study on BAT / BEP for the elimination technology of waste containing PCNs, is available	MoEF, Mol, MoRT/NRIA, AAAT
5	<u>SCCPs</u> Study on BAT / BEP for elimination technology of waste or articles containing SCCPs	The results study on BAT / BEP for the elimination technology of waste containing SCCPs, is available	MoEF, Mol, MoRT/NRIA, AAAT
6	<u>PCPs</u> Study on BAT / BEP for elimination technology of waste or articles containing PCPs	The results study on BAT / BEP for the elimination technology of waste containing PCPs, is available	MoEF, Mol, MoRT/NRIA, AAAT
7	<u>POP-PBDEs, HBB, dan HBCD</u> Applying BAT / BEP that has been prepared in management of waste containing POP-PBDEs, HBB, and HBCD	Reports on the application of BAT / BEP that has been prepared in management of waste containing POP-PBDEs, HBB, and HBCD, is available	MoEF, Mol, MoRT/NRIA, AAAT
8	<u>PFOS, it salt, dan PFOSE</u> Study on BAT/BEP for elimination technology of waste containing PFOS, it salts and PFOSE	The result study on BAT / BEP for elimination technology of waste containing PFOS, its salts, and PFOSE, are available	MoEF, Mol, MoRT/NRIA, AAAT

4.3.8. Identification of Contaminated Sites (Annex A, B, and C of Chemicals) and Environmentally Sound Remediation

Currently, hazardous waste contaminated site has been routinely restored, as part of activities to restore environmental functions. However, special recovery activities for POPs have not been carried out yet. Identification of POPs contaminated site based on contaminated site data is now become a priority for NIP POPs. In addition, a study is also needed on methods of restoring POPs contaminated site. The action plan for the identification of contaminated site (Annex A, B, and C of Chemicals) and environmentally sound remediation is presented in Table 4.8, as follows:

Table 4.8 Action Plan for Identification of Contaminated Site (Annex A, B, and C of Chemicals) and Environmentally Sound Remediation

No	Action Plan	Performance Indicator	Executing Agencies
1	Identify contaminated site and restoring POPs contaminated site.	Report on identification of contaminated site and restoration of POPs contaminated site, is available	MoEF, MoA, Mol
2	Study on identifying methods for contaminated site and restoring POPs contaminated site.	Methods of identifying contaminated site and restoration of POPs contaminated site, is available	MoEF, MoH, MoRT/NRIA, IIS, AAAT

4.3.9. Information Exchange and Stakeholder Involvement

Since ratified the Stockholm Convention, Indonesia has shared information with other countries and has responded to requests for information from these countries and from the Secretariat. These activities will further continue, including updating the information of the new POPs list with respect to the Convention. In addition, information presentation to all stakeholders related to POPs is also a priority activity in the NIP POPs. An action plan to facilitate or exchange of information and stakeholder involvement is presented in Table 4.9, as follows:

Table 4.9 Action Plan for Information Exchange and Stakeholder Involvement

No	Action Plan	Performance Indicator	Executing Agencies
1	Share information continually with other countries and respond the	Information exchange regularly between the countries, is carried out	MoEF, MoA

	requests for information from these countries and from the Secretariat.		
2	Disseminate of information on POPs regularly, at least once a year involving the stakeholders.	Information on POPs to the stakeholders, is delivered	MoEF, MoA, MoF, MoT, MoI, MoRT/NRIA

4.3.10. Public Awareness, Information and Education

With respect to the mandate of the Stockholm Convention, Indonesia as a country party has obliged to facilitate and promote public awareness, information and education regarding POPs. These activities have been carried out routinely and are still be considered as priority activities. The action plan for public awareness, information and education is shown in Table 4.10.

Table 4.10 Action Plan for Increasing Public Awareness, Information and Education

No	Action Plan	Performance Indicator	Executing Agencies
1	Perform an information / communication system for all aspects of POPs for various stakeholders	Information on POPs through articles, is delivered.	MoEF, MoA, MoF, MoT, MoI, MoRT/NRIA
2	Intensify education and increase awareness on POPs	Education and increasing awareness activities on POPs, is carried out.	MoEF, MoA, MoF, MoT, MoI, MoRT/NRIA, MoEC
3	Intensify the campaign on POPs	Campaign activities on POPs, is carried out.	MoEF, MoA, MoF, MoT, MoI, MoRT/NRIA

4.3.11. Reporting

Under Article 15 of the Stockholm Convention, Indonesia has committed to submit a national report to the Secretariat. Reports on the application of the Stockholm Convention are prepared at least once a year, the action plan are listed in Table 4.11.

Table 4.11 Action Plan for Reporting

No	Action Plan	Performance Indicator	Executing Agencies
1	Collect national data on the application of the Convention	National data on the application of the Convention, is compiled.	All related AGENCIES
2	Formulate a national report on the application of the Convention	Regularly national reports to the Secretariat, is submitted.	All related AGENCIES

4.3.12. Research, Development and Monitoring

Some researches on the status of environmental contamination by POPs have been conducted in several locations in Indonesia, but not yet comprehensive and integrated, and have not linked it potential to the public health and the environment impacts. For this reason, the action plan needs to include the review, research and monitoring of the POPs exposure impact to the public health and the environment. Action plans for research, development and monitoring are presented in Table 4.12

Tabel 4.12 Action Plan Research, development and monitoring

No	Action Plan	Performance Indicator	Executing Agencies
1	Inventory and Identify laboratories that capable and / or certified of testing the POPs	Data of laboratories that has the capability and / or certified of testing the POPs, is availabled	MoRT/NRIA, IIS, MoEF, MoA
2	Monitor exposure impact of POPs to human health and the environment	A national monitoring program and data of exposure impact of POPs, are conducted.	MoH, MoEF, MoA
3	Organize workshops for academic institutions	Workshops in 10 Universities, are conducted	MoRT/NRIA, MoEF, IIS, MoA

4.3.13. Technical and Financial Assistance

Indonesia needs technical and financial assistance to develop and strengthen its capacity to implement the provisions of the Convention. Such technical and financial assistance is needed especially for activities that covers inventory, research, laboratory, training, institutional development and technology transfer. Funding for activities is obtained through financial assistance from the Stockholm Convention Secretariat and / or related donors. The action plan for this activity is to develop and submit a proposal to the Secretariat of the Stockholm Convention and / or other donors (Table 4.13).

Table 4.13 Action Plans related to Technical and Financial Assistance

No	Action Plan	Performance Indicator	Executing Agencies
1	Submit the proposals to the Stockholm Convention Secretariat and / or relevant donors.	Proposals, are availabled and submitted	All related AGENCIES

4.4. Timeline of Implementation

The action plan of POPs management will be carried out according to the schedule in Table 4.14.

Table 4.14. Timeline of Action Plan Implementation

No	Action Plan	Performance Indicators	Time period	Executing Agencies	Responsible Agencies
A	Efforts to strengthen regulations				
1.	Evaluate the laws and regulations related to the Stockholm Convention.	The result of a review of the laws and regulations related to the Stockholm Convention, is compiled.	2021–2022	MoEF, MoA, Mol, MoF, MoT	MoEF
2.	Review the effectiveness of the enforcement of laws and regulations related to the arrangement and management of the Stockholm Convention on POPs	The results study on the effectiveness of the enforcement of laws and regulations related to the arrangement and management of the Stockholm Convention on POPs, is compiled	2021–2022	MoEF, MoA, Mol, MoF, MoT	MoEF
3.	Ensure all POPs compounds in the Stockholm Convention are arranged in the regulations on Hazardous Substances Management	The Government Regulation on Hazardous Substances Management, contains POPs compounds in the Stockholm Convention, is stipulated.	2021–2022	MoEF, MoA, Mol, MoF, MoT	MoEF
4.	Review the need on regulatory / policy related to the arrangement and management of the Stockholm Convention on POPs	The results of a review on the need of regulatory / policy related to the regulation and management of POPs in the Stockholm Convention, is compiled.	2021–2022	MoEF, MoA, Mol, MoF, MoT	MoEF
5.	Review the formulation of POPs quality standards for environmental protection and health protection and human safety	The results of a review on the formulation of POPs quality standards for environmental	2021–2022	MoEF, MoH, MoRT/NRIA, IIS	MoEF

No	Action Plan	Performance Indicators	Time period	Executing Agencies	Responsible Agencies
		protection and health protection human safety, is compiled.			
B	Efforts to Strengthening Institutions and Capacity Building				
1.	Establish POPs National Committee	The National Committee of POPs, is determined.	Continuously	MoEF, MoA, Mol, MoT, MoH, MoRT/NRIA, IIS, AAAT, NADFC	MoEF
2.	Organizing an annual workshop on the formulation of a detailed annual plan for the implementation of NIP POPs in Indonesia, which is coordinated by the focal point and attended by all relevant stakeholders, including a workshop on evaluation of its implementation.	An annual workshop on the formulation of a detailed annual plan for the implementation of NIP POPs, is held.	2021–2022	MoEF, MoA, Mol, MoT, MoF	MoEF
3.	Strengthen the knowledge management system on POPs in Indonesia which includes: acquisition, storage, processing, dissemination and exchange of knowledge	The use of knowledge management systems on POPs in Indonesia, both in terms of content and the users, is increased.	2021–2022	MoEF, MoA, MoRT/NRIA, IIS, AAAT	MoRT/NRIA
4.	Develop the human resources capacity in the central government, provincial governments, district / city governments, POPs users, communities, and other relevant stakeholders.	Capacity development on POPs at least once a year, is carried out	2021–2022	MoEF, MoA, Mol, MoT, MoF	MoEF
C	Measures to reduce or eliminate releases from intentional production and its use				
1.	Set up the life cycle of all POPs Pesticides in line with obligations of the Stockholm Convention, including import and export arrangements.	POPs pesticide life cycle arrangements in line with the Stockholm Convention's obligation,	2021–2022	MoA, MoEF, MoF, MoT, Mol	MoA

No	Action Plan	Performance Indicators	Time period	Executing Agencies	Responsible Agencies
		including import and export arrangements, is issued			
2.	Monitor the activities indicated using or producing or releasing the POPs compounds	Activities indicated using or producing or releasing POPs compounds, are monitored.	2021–2022	MoA, MoEF, Mol	Mol
3.	Set up the list of POPs articles into the annex of the ministerial regulation in charge of the trade sector that regulates articles that are prohibited from import	A ministerial regulation in charge of the trade sector which accommodates a list of prohibited imports, is issued	2021–2022	MoA, MoEF, MoF, MoT, Mol	MoT
D	Registration for Special Exemptions/ Acceptable Purpose				
1.	Review and assess the status and need for production / use of POPs that are registered with specific exemptions / acceptable purposes, to be considered for registration to the Secretariat of the Convention.	The assessment of status and production needs / use of registered POPs with specific exemptions / acceptable purposes, is compiled.	2021–2022	MoA, MoEF, MoF, MoT, Mol, MoRT/NRIA, IIS	MoEF
E	Measures To Reduce Releases from Unintentional Product				
1.	Strengthen laboratory capacity to perform UPOPs measurements (PCDDs / Fs, PCB, HCB, PeCB)	The capability of national laboratories capacity of sampling and analyzing UPOPs (PCDD / PCDF, PCB, HCB, PeCB), is strengthened	2021–2022	MoEF, MoRT/NRIA, IIS, MoA, AAAT	MoRT/NRIA
2.	Inventory and review the UPOPs (PCDDs / Fs, PCBs, HCB, PeCB)	Databases on UPOPs inventory and release assessment, is available	2021–2022	MoEF, MoRT/NRIA, IIS, MoA, Mol, MoH	MoEF

No	Action Plan	Performance Indicators	Time period	Executing Agencies	Responsible Agencies
3.	Introducing BAT and BEP to the waste and solid waste incineration sector	<ul style="list-style-type: none"> BAT / BEP guidelines and handbook for waste and solid waste incinerators, is available BAT and BEP demonstrations on waste and solid waste incineration, is implemented. 	2021–2022	MoEF, MoRT/NRIA, AAAT	MoEF
4.	Introducing BAT and BEP to the metal industry sector	<ul style="list-style-type: none"> BAT / BEP guidelines and handbook for the metal industry, is available BAT and BEP demonstrations in the metal industry sector, is implemented. 	2021–2022	Mol, MoEF	Mol
5.	Monitoring the activities indicated release of UPOPs compounds	Monitoring of activities indicated release UPOPs compounds, is implemented.	2021–2022	MoEF, MoA, Mol	MoEF
F	Identification of stockpiles, articles in use and their waste				
1.	<u>POP Pesticide</u> Inventory of stockpiles, articles still in use and POPs pesticide waste	POPs pesticide inventory reports, is available	2021–2022	MoEF, MoA, Mol	MoEF
2.	<u>PCB</u> Inventory of stockpiles, articles in use and waste PCBs	PCBs inventory reports, is available	2021–2022	MoEF, MoEMR, Mol	MoEF
3.	<u>POP-PBDEs, HBB, dan HBCD</u> Inventory of stockpiles, articles still in use and waste POP-PBDEs, HBB, and HBCD	POP-PBDEs, HBB, and HBCD inventory reports, is available	2021–2022	MoEF, Mol	MoEF

No	Action Plan	Performance Indicators	Time period	Executing Agencies	Responsible Agencies
4.	<u>HCB</u> Inventory of stockpiles, articles that are still in use and HCB waste	HCB inventory reports, is available	2021–2022	MoEF, MoI	MoEF
5.	<u>PCNs</u> Inventory of stockpiles, articles in use and waste PCNs	PCNs inventory reports, is available	2021–2022	MoEF, MoI	MoEF
6.	<u>SCCPs</u> Inventory of stockpiles, articles still in use and waste SCCPs	SCCPs inventory reports, is available	2021–2022	MoEF, MoI	MoEF
7.	<u>PFOS, its salts, and PFOSE</u> Inventory of stockpiles, articles still in use and waste PFOS, salts, and PFOSE	PFOS, it salts and PFOSE Inventory reports, are available	2021–2022	MoEF, MoI	MoEF
8.	<u>PCPs</u> Inventory of stockpiles, articles in use and waste PCPs	PCPs on use and waste in industry inventory reports, is available	2021–2022	MoEF, MoI	MoEF
G	Stockpile Management and Proper Manner of Handling and Eliminating Articles in Use				
1.	<u>POP Pesticide</u> Manage pesticide stockpiles and appropriate measures for handling the stockpile and eliminate of pesticide waste	<ul style="list-style-type: none"> Guidelines of POPs stockpile management, is available. Guidelines of POPs storage and disposal management are available 	2021–2022	MoA, MoEF, MoI	MoEF
2.	<u>PCBs</u> Prepare BAT / BEP or technical guidelines for waste or articles containing PCBs management	BAT / BEP implementation reports or technical guidelines waste	2021–2022	MoEF, MoEMR, MoI, MoRT/NRIA, AAAT	MoEF

No	Action Plan	Performance Indicators	Time period	Executing Agencies	Responsible Agencies
		management or articles containing PCBs, are available			
3.	<u>HCBD</u> Study on BAT / BEP for the elimination technology of waste or articles containing HCBD	The results study on BAT / BEP for the elimination technology of waste containing HCBD, is available	2021–2022	MoEF, MoI, MoRT/NRIA, AAAT	MoEF
4.	<u>PCNs</u> Study on BAT / BEP for elimination technology of waste or articles containing PCNs	The results study on BAT / BEP for the elimination technology of waste containing PCNs, is available	2021–2022	MoEF, MoI, MoRT/NRIA, AAAT	MoEF
5.	<u>SCCPs</u> Study on BAT / BEP for elimination technology of waste or articles containing SCCPs	The results study on BAT / BEP for the elimination technology of waste containing SCCPs, is available	2021–2022	MoEF, MoI, MoRT/NRIA, AAAT	MoRT/NRIA
6.	<u>PCPs</u> Study on BAT / BEP for elimination technology of waste or articles containing PCPs	The results study on BAT / BEP for the elimination technology of waste containing PCPs, is available	2021–2022	MoEF, MoI, MoRT/NRIA, AAAT	MoEF
7.	<u>POP-PBDEs, HBB, dan HBCD</u> Applying BAT / BEP that has been prepared in management of waste containing POP-PBDEs, HBB, and HBCD	Reports on the application of BAT / BEP that has been prepared in management of waste containing POP-PBDEs, HBB, and HBCD, is available	2021–2022	MoEF, MoI, MoRT/NRIA, AAAT	MoEF
8.	<u>PFOS, it salt, dan PFOSE</u> Study on BAT/BEP for elimination technology of waste containing PFOS, it salts and PFOSE	The result study on BAT / BEP for elimination technology of waste containing PFOS, its salts, and PFOSE, are available	2021–2022	MoEF, MoI, MoRT/NRIA, AAAT	MoRT/NRIA
H	Identification of Contaminated Site (Annex A, B, and C of Chemicals) and Environmentally Sound Remediation				

No	Action Plan	Performance Indicators	Time period	Executing Agencies	Responsible Agencies
1.	Identify contaminated site and restoring POPs contaminated site.	Report on Identification of contaminated site and restoration of POPs contaminated site, is available	2021–2022	MoEF, MoA, MoI	MoEF
2.	Study on identifying methods for contaminated site and restoring POPs contaminated site.	Methods of identifying contaminated site and restoration of POPs contaminated site, is available	2021–2022	MoEF, MoH, MoRT/NRIA, IIS, AAAT	MoEF
I	Information Exchange and Stakeholders Involvement				
1.	Share information continually with other countries and respond the requests for information from these countries and from the Secretariat.	Information exchange regularly between the countries, is carried out	2021–2022	MoEF, MoA	MoEF
2.	Disseminate of information on POPs regularly, at least once a year involving the stakeholders.	Information on POPs to the stakeholders, is delivered	2021–2022	MoEF, MoA, MoF, MoT, MoI, MoRT/NRIA, AAAT	MoEF
J	Increasing Public Awareness, Information and Education				
1.	Perform an information / communication system for all aspects of POPs for various stakeholders	Information on POPs through articles, is delivered.	2021–2022	MoEF, MoA, MoF, MoT, MoI, MoRT/NRIA, AAAT, IIS	MoEF
2.	Intensify education and increase awareness on POPs	Education and increasing awareness activities on POPs, is carried out.	2021–2022	MoEF, MoA, MoF, MoT, MoI, MoRT/NRIA, MoEC, AAAT	MoEF
3.	Intensify the campaign on POPs	Campaign activities on POPs, is carried out.	2021–2022	MoEF, MoA, MoF, MoT, MoI, MoRT/NRIA, MoCI	MoEF

No	Action Plan	Performance Indicators	Time period	Executing Agencies	Responsible Agencies
K	Reporting				
1.	Collect national data on the application of the Convention	National data on the application of the Convention, is compiled.	2021–2022	All related AGENCIES	MoEF
2.	Formulate a national report on the application of the Convention	Regularly national reports to the Secretariat, is submitted.	2021–2022	All related AGENCIES	MoEF
L	Research, development and monitoring				
1.	Inventory and Identify laboratories that capable and / or certified of testing the POPs	Data of laboratories that has the capability and / or certified of testing the POPs, is available	2021	MoRT/NRIA, IIS, MoEF, MoA	MoRT/NRIA
2.	Monitor exposure impact of POPs to human health and the environment	A national monitoring program and data of exposure impact of POPs, are conducted.	2021–2022	MoH, MoEF, MoA	MoH
3.	Organize workshops for academic institutions	Workshops in 10 Universities, are conducted	2021–2022	MoRT/NRIA, MoEF, IIS, MoA, AAAT	MoRT/NRIA
M	Technical and Financial Assistance				
1.	Submit the proposals to the Stockholm Convention Secretariat and / or other donors.	Proposals, are available and submitted	2021–2022	All related AGENCIES	MoEF

ANNEXES

Annex 1. Results of monitoring for POPs pesticides in the environment

Table 1. POPs Test Results for DDT Parameters with BMR SNI 7313: 2008 in Cirebon Regency

Sub-Regency	Village	Commodity	4.4-DDT	4.4-DDE	4.4-DDD	2.4-DDT	BMR (mg/kg)
Losari	Kalirahayu	Corn	<0.0008	<0.0033	<0.0033	<0.0008	max 0.1
Losari	Kalirahayu	Paddy	<0.0008	<0.0033	<0.0033	<0.0008	max 0.1
Losari	Kalirahayu	Onion	<0.0008	<0.0033	<0.0033	<0.0008	max 1
Pabedilan	Pabedilan Kaler	Corn	<0.0008	<0.0033	<0.0033	<0.0008	max 0.1
Pabedilan	Pabedilan Kaler	Paddy	<0.0008	<0.0033	<0.0033	<0.0008	max 0.1
Pabedilan	Pabedilan Kaler	Onion	<0.0008	<0.0033	<0.0033	<0.0008	max 1
Gebang	Pelayangan	Paddy	<0.0008	<0.0033	<0.0033	<0.0008	max 0.1
Pabedilan	Pabedilan Kidul	Paddy	<0.0008	<0.0033	<0.0033	<0.0008	max 0.1
Pabedilan	Pabedilan Kidul	Corn	<0.0008	<0.0033	<0.0033	<0.0008	max 0.1
Pabedilan	Pabedilan Kidul	Corn	<0.0008	<0.0033	<0.0033	<0.0008	max 0.1

Source: Environmental sample analysis report for POPs in Cirebon Regency and Karawang Regency (2020)

Table 2. POPs Test Results for DDT Parameters with BMR SNI 7313: 2008 in Karawang Regency

Sub-Regency	Village	Commodity	4.4-DDT	4.4-DDE	4.4-DDD	2.4-DDT	BMR (mg/kg)
Rawamerta	Mekarjaya	Paddy	<0.0008	<0.0033	<0.0033	<0.0008	maks 0.1
Rawamerta	Mekarjaya	Paddy	<0.0008	<0.0033	<0.0033	<0.0008	maks 0.1
Rawamerta	Mekarjaya	Paddy	<0.0008	<0.0033	<0.0033	<0.0008	maks 0.1
Telagasari	Talagasari	Paddy	<0.0008	<0.0033	<0.0033	<0.0008	maks 0.1
Telagasari	Talagasari	Paddy	<0.0008	<0.0033	<0.0033	<0.0008	maks 0.1
Telagasari	Talagasari	Paddy	<0.0008	<0.0033	<0.0033	<0.0008	maks 0.1
Pedes	Sungaibuntu	Paddy	<0.0008	<0.0033	<0.0033	<0.0008	maks 0.1
Pedes	Sungaibuntu	Paddy	<0.0008	<0.0033	<0.0033	<0.0008	maks 0.1
Pedes	Sungaibuntu	Paddy	<0.0008	<0.0033	<0.0033	<0.0008	maks 0.1
Pedes	Sungaibuntu	Paddy	<0.0008	<0.0033	<0.0033	<0.0008	maks 0.1

Source: Environmental sample analysis report for POPs in Cirebon Regency and Karawang Regency (2020)

Table 3. POPs Test Results in Cirebon Regency

Sub-Regency	Village	Commodity	Trans-Chlordane	Cis-Chlordane	Heptachlor epoxide	Aldrin	Endrin	Dieldrin
Losari	Kalirahayu	Corn	<0.0167	<0.0167	<0.0033	<0.0057	<0.0033	<0.0033
Losari	Kalirahayu	Paddy	<0.0167	<0.0167	<0.0033	<0.0057	<0.0033	<0.0033
Losari	Kalirahayu	Onion	<0.0167	<0.0167	<0.0033	<0.0057	<0.0033	<0.0033
Pabedilan	Pabedilan Kaler	Corn	<0.0167	<0.0167	<0.0033	<0.0057	<0.0033	<0.0033
Pabedilan	Pabedilan Kaler	Paddy	<0.0167	<0.0167	<0.0033	<0.0057	<0.0033	<0.0033
Pabedilan	Pabedilan Kaler	Onion	<0.0167	<0.0167	<0.0033	<0.0057	<0.0033	<0.0033
Gebang	Pelayangan	Paddy	<0.0167	<0.0167	<0.0033	<0.0057	<0.0033	<0.0033
Pabedilan	Pabedilan Kidul	Paddy	<0.0167	<0.0167	<0.0033	<0.0057	<0.0033	<0.0033
Pabedilan	Pabedilan Kidul	Corn	<0.0167	<0.0167	<0.0033	<0.0057	<0.0033	<0.0033
Pabedilan	Pabedilan Kidul	Corn	<0.0167	<0.0167	<0.0033	<0.0057	<0.0033	<0.0033

Source: Environmental sample analysis report for POPs in Cirebon Regency and Karawang Regency, 2020

Table 4. POPs Test Results in Karawang Regency

Sub-Regency	Village	Commodity	Trans-Chlordane	Cis-Chlordane	Heptachlor	Aldrin	Endrin	Dieldrin
Rawamerta	Mekarjaya	Paddy	<0.0167	<0.0167	epoxide	<0.0057	<0.0033	<0.0033
Rawamerta	Mekarjaya	Paddy	<0.0167	<0.0167	<0.0033	<0.0057	<0.0033	<0.0033
Rawamerta	Mekarjaya	Paddy	<0.0167	<0.0167	<0.0033	<0.0057	<0.0033	<0.0033
Telagasari	Talagasari	Paddy	<0.0167	<0.0167	<0.0033	<0.0057	<0.0033	<0.0033
Telagasari	Talagasari	Paddy	<0.0167	<0.0167	<0.0033	<0.0057	<0.0033	<0.0033
Telagasari	Talagasari	Paddy	<0.0167	<0.0167	<0.0033	<0.0057	<0.0033	<0.0033
Pedes	Sungaibuntu	Paddy	<0.0167	<0.0167	<0.0033	<0.0057	<0.0033	<0.0033
Pedes	Sungaibuntu	Paddy	<0.0167	<0.0167	<0.0033	<0.0057	<0.0033	<0.0033
Pedes	Sungaibuntu	Paddy	<0.0167	<0.0167	<0.0033	<0.0057	<0.0033	<0.0033
Pedes	Sungaibuntu	Paddy	<0.0167	<0.0167	<0.0033	<0.0057	<0.0033	<0.0033

Source: Environmental sample analysis report for POPs in Cirebon Regency and Karawang Regency, 2020

Table 5. POPs Residue in Rice-field Soil

POPs Residue	POPs Residue in rice-field Soil (mgkg ⁻¹)				
	Wonosobo	Banjarnegara	Cilacap	Bandung	Karawang
Year	2015	2015	2015	2018	2018
Lindane	0.0141 ± 0.0255	0.0106 ± 0.0032	0.0170 ± 0.0083		
Heptachlor	0.0120 ± 0.0285	0.0167 ± 0.0582	0.0012 ± 0.0013		
Aldrin	0.0069 ± 0.0070	0.0100 ± 0.0113	0.0073 ± 0.0067		
Chlordane	0.0581 ± 0.0245	0.0912 ± 0.0600	0.0387 ± 0.0547	0.1315 ± 0.1748	0.1021 ± 0.1142
Endosulfan	0.0034 ± 0.0027	0.0576 ± 0.6100	0.0082 ± 0.0074	0.0041 ± 0.0084	0.0082 ± 0.0139
Toxaphene	0.8908 ± 1.9047	0.3765 ± 0.2764	0.1938 ± 0.2741		
Dieldrin	0.0551 ± 0.0870	0.0653 ± 0.1769	0.0046 ± 0.0019	0.0132 ± 0.0196	0.0086 ± 0.0201
Endrin	0.0096 ± 0.0164	0.0386 ± 0.0458	0.0218 ± 0.0177		
DDT	0.0231 ± 0.0870	0.0059 ± 0.0056	0.0155 ± 0.0187		
Mirex	0.0057 ± 0.0061	0.0047 ± 0.0045	0.0055 ± 0.0041		

Source: Environmental Agricultural Research Institute/Balai Penelitian Pertanian Lingkungan (Balingtan), 2015 dan 2018

Table 6. Residue levels of POPs in Serayu River and Citarum River water

POPs Residue	POPs Residue Level (ppm)	
	Serayu River	Citarum River
Year	2015	2018
Lindane	-	0.011
Heptachlor	0.0015 ± 0.0003	0.011
Aldrin	0.0019 ± 0.0000	not detected
Chlordane	0.0494 ± 0.0000	
Endosulfan	0.0001 ± 0.0001	not detected
Toxaphene	0.4967 ± 0.5631	
Dieldrin	0.0008 ± 0.0000	0.01
Endrin	0.0133 ± 0.0098	not detected
DDT	0.0922 ± 0.0000	not detected

Source: Environmental Agricultural Research Institute/Balai Penelitian Pertanian Lingkungan (Balington), 2015 dan 2018

Table 7. POPs Residue in Soil at Vegetable Center (mg·kg⁻¹)

Residu POPs	West Java	Central Java	East Java	South Sulawesi
Heptachlor	0,0042 ± 0,029	0,0015 ± 0,0025	0,0002 ± 0,0008	nd
Endosulfane	0,0038 ± 0,0039	0,0016 ± 0,0026	0,0003 ± 0,0012	0,0018 ± 0,0018
Dieldrin	0,0056 ± 0,0054	0,0066 ± 0,0067	0,0037 ± 0,0053	0,0036 ± 0,0009
Chlordane	0,0064 ± 0,0060	0,0068 ± 0,0061	0,0045 ± 0,0051	0,0030 ± 0,0013
Residu POPs	West Sumatera	North Sumatera	West Nusa Tenggara	Jambi
Heptachlor	0,0023 ± 0,0002	nd	0,0031 ± 0,0020	nd
Endosulfan	0,0028 ± 0,0009	nd	0,0055 ± 0,0036	nd
Dieldrin	0,0039 ± 0,0021	0,0019 ± 0,0001	0,0054 ± 0,0053	0,0048 ± 0,0048
Chlordan	0,0065 ± 0,0068	0,0024 ± 0,0015	0,0064 ± 0,0062	0,0034 ± 0,0023

Source: Environmental Agricultural Research Institute/Balai Penelitian Pertanian Lingkungan (Balington), 2015 dan 2018

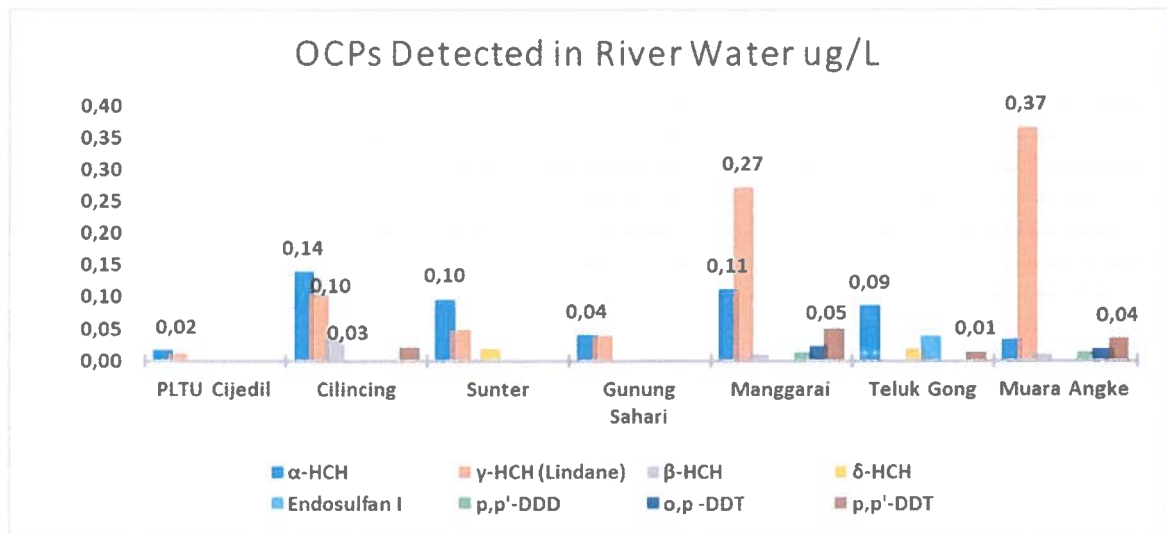


Figure 1. Concentration of POPs pesticides in river water (2018) ($\mu\text{g}\cdot\text{L}^{-1}$)

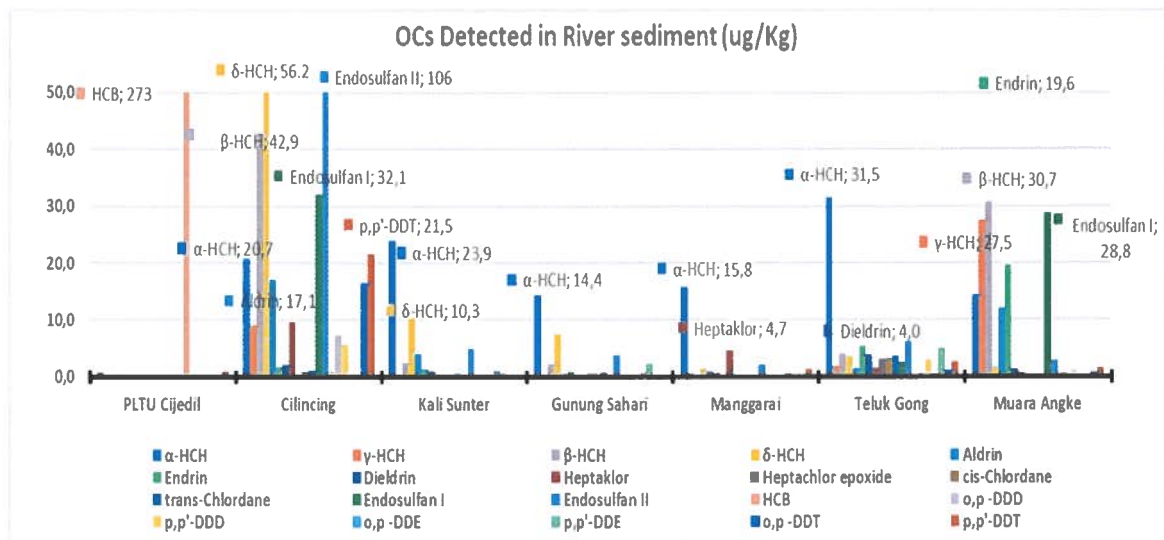


Figure 2. Concentration of POPs pesticides in River Sediments (2018) ($\mu\text{g}\cdot\text{kg}^{-1}$)

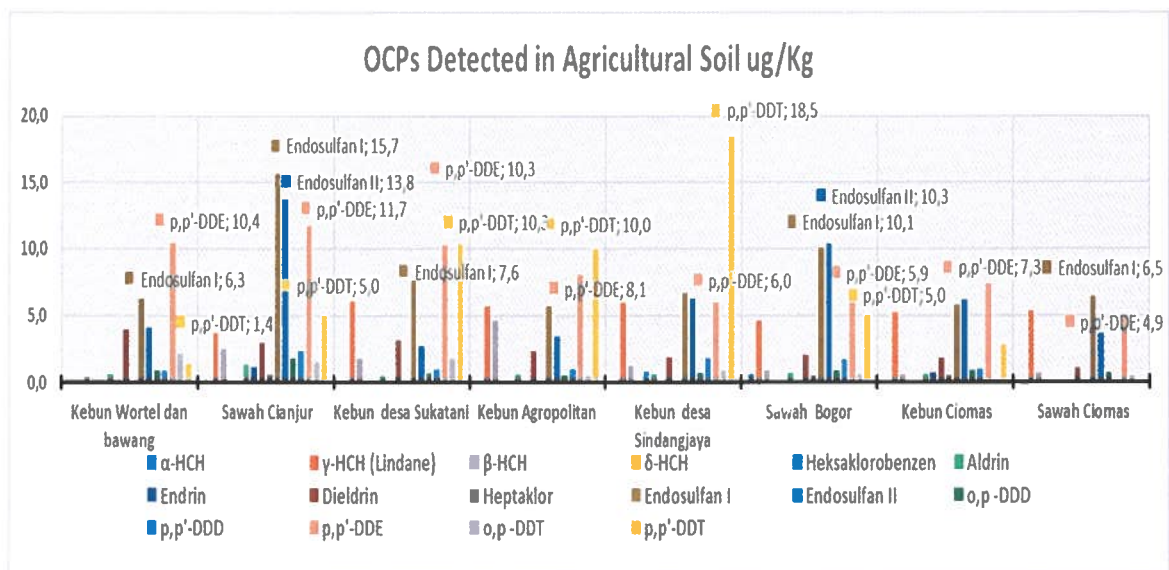


Figure 3. The concentration of pesticide POPs detected in agricultural soils ($\mu\text{g}\cdot\text{kg}^{-1}$)

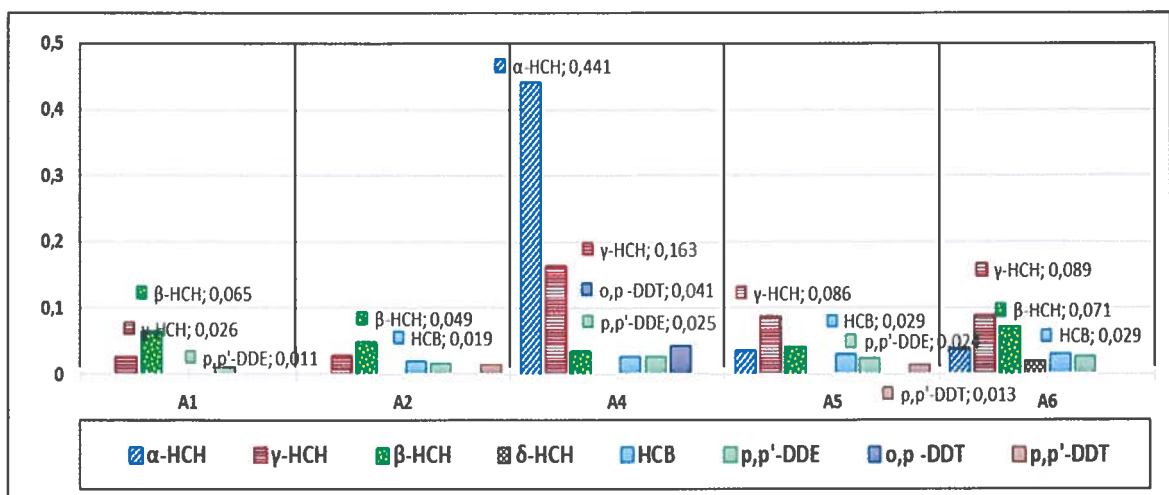


Figure 4. Concentrations of POPs pesticides detected in Ciliwung River Water (2018) ($\mu\text{g}\cdot\text{L}^{-1}$)

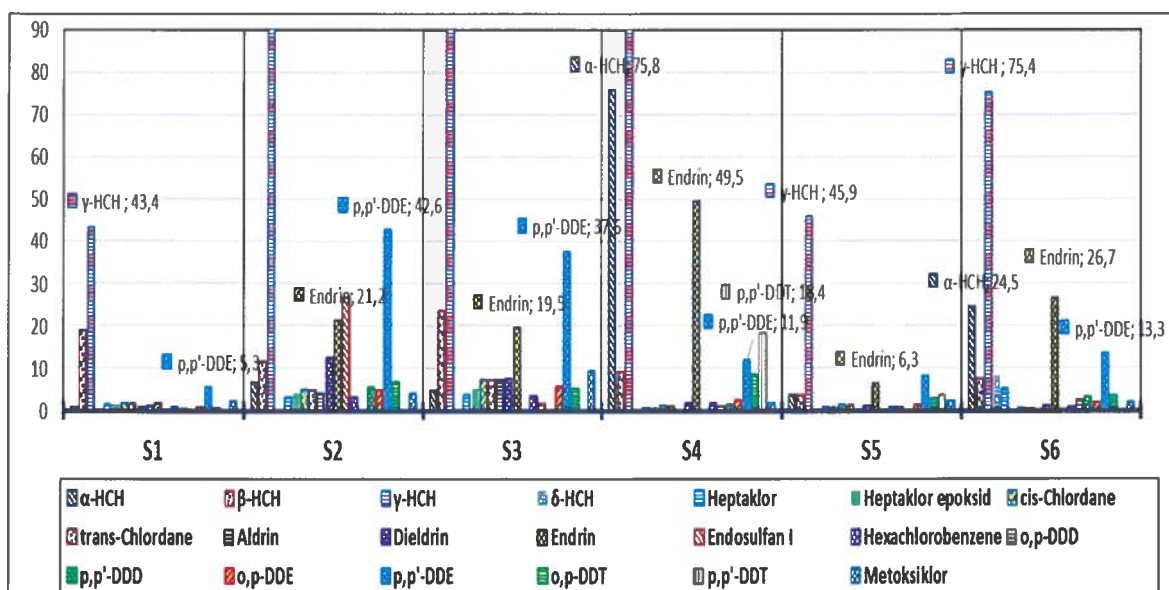


Figure 5. Concentrations of POPs pesticides in Ciliwung River Sediment (2018) (µg/Kg)

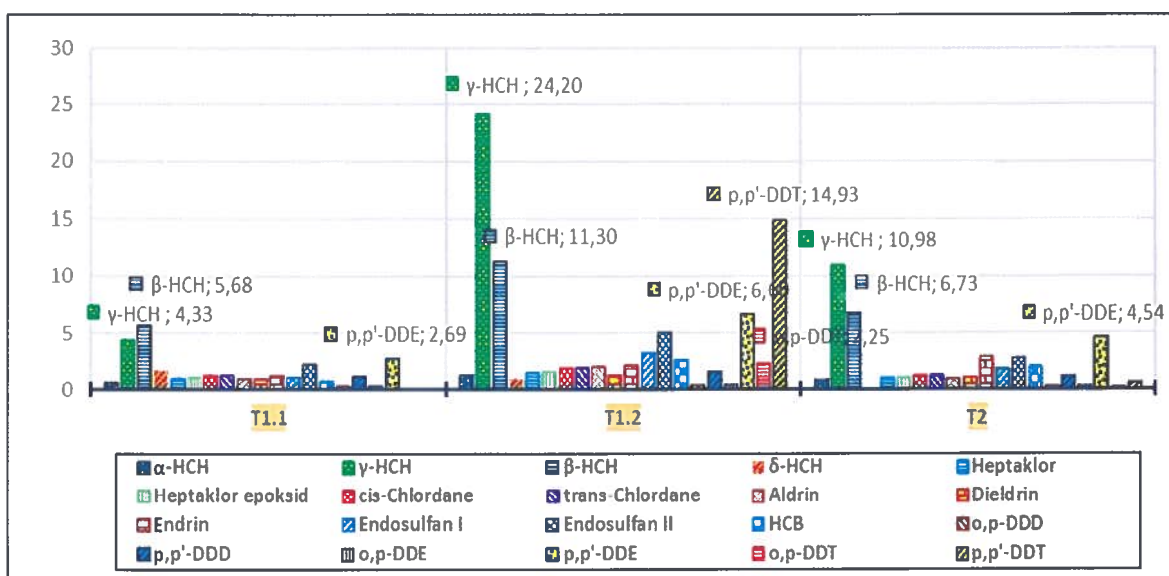


Figure 6. POPs concentrations in garden soils around the Ciliwung River (µg·kg⁻¹)

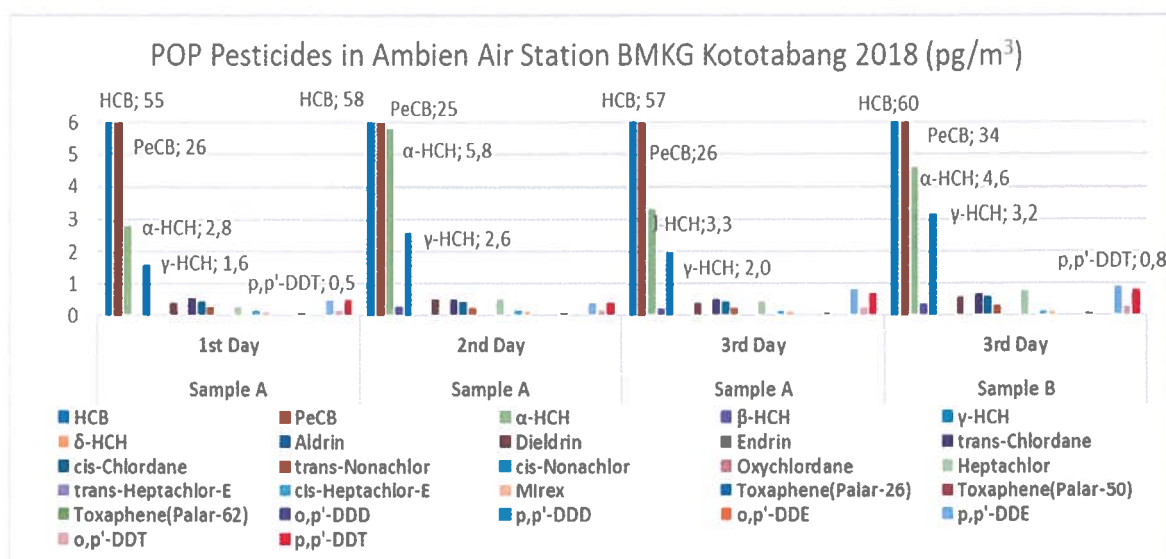


Figure 7. Concentrations of POPs pesticides in ambient air at the Kototabang BMKG Station that were taken actively with HVS (2018) ($\text{pg}\cdot\text{m}^{-3}$)

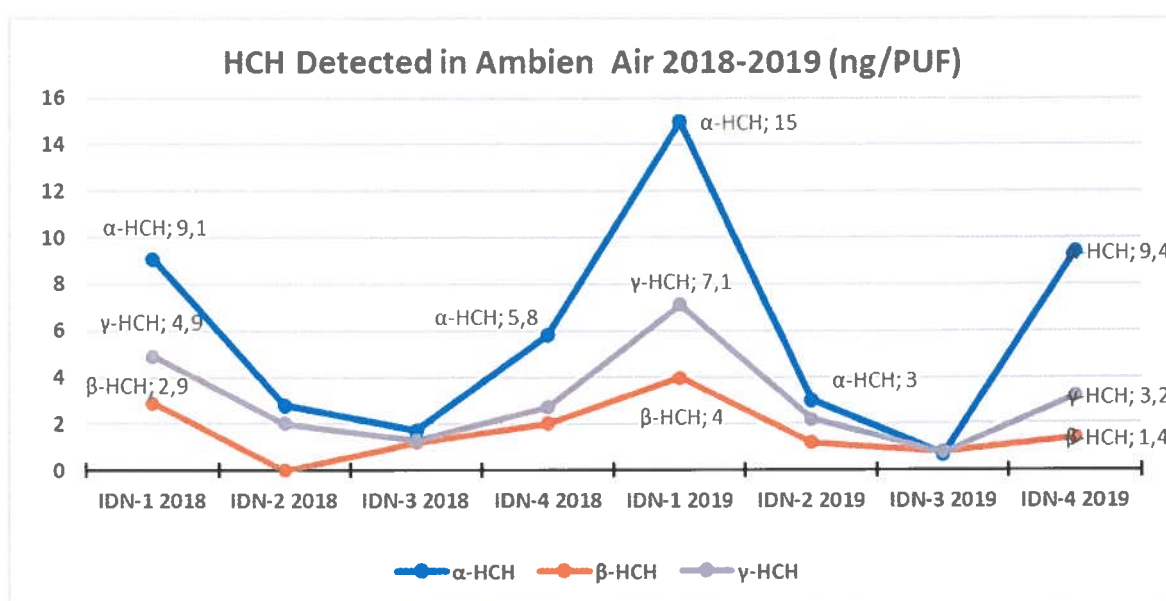


Figure 8. Trends in the HCH group in the ambient air of the BMKG Jakarta station in 2018-2019 ($\text{ng}\cdot\text{PUF}^{-1}$)

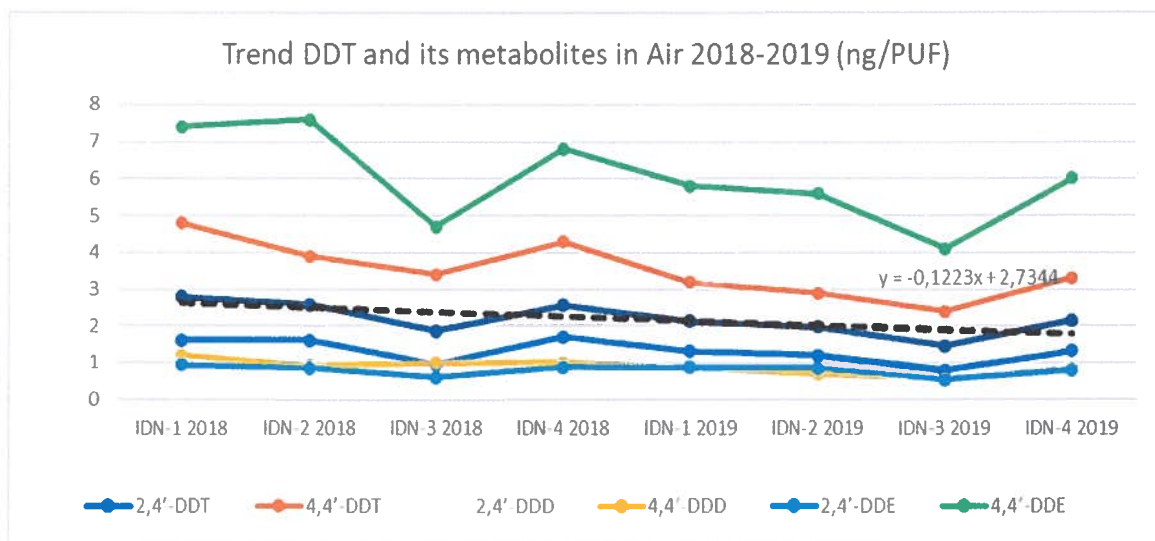


Figure 9. Concentration of DDT and its derivatives in the air at BMKG stations 2018-2019 (ng·PUF⁻¹)

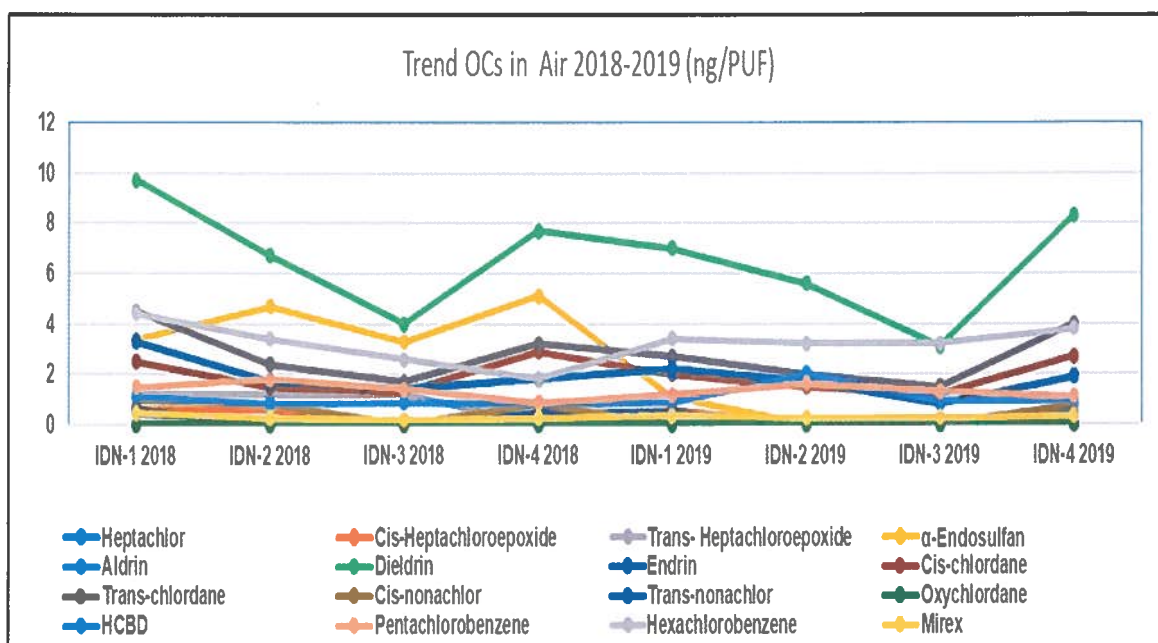


Figure 10. Concentration of OCs in ambient air at BMKG Jakarta station 2018-2019 (ng·PUF⁻¹)

Annex 2. Results of Monitoring PCBs in the environment

Table 1. PCB Level in Green Shells in Jakarta Bay¹

Length-Width (mm)	Small (ppb)	Medium (ppb)	Big (ppb)
1. Length	60,00	64,05	81,08
Width	28,05	32,04	37,08
2. Length	55,05	67,06	77,05
Width	24,08	33,01	34,02
3. Length	58,08	61,05	87,07
Width	28,05	30,00	39,01
PCB, ppb total level	2,540	2,563	6,054
ppb Average level	0,846	0,854	2,018
% fat level	1,55	1,575	1,590
Threshold value (USDHHS, 2011)	2000		
EPA (1972)	1500		
FAO/WHO (1986)	200		

Table 2. Total PCBs content in monitoring at the Kototabang Meteorological Agency with HVS (2018)²

Homolog	Sample A	Sample A	Sample A	Sample A	Sample B	All
	1st Day	2nd Day	3rd Day	Average	3rd Day	Average
	pg·m ⁻³					
totalMoCBs	2,8	5,2	3,4	3,9	4,3	4,0
totalDiCBs	40	71	75	62	75	66
totalTriCBs	6,4	13	7,9	9,0	10	9,4
totalTeCBs	5,0	8,1	3,8	5,7	4,8	5,5
totalPeCBs	1,6	2,6	1,2	1,9	1,6	1,9
totalHxCBs	0,73	1,1	0,71	0,92	0,92	0,93
totalHpCBs	(0,16)	0,21	(0,13)	(0,17)	(0,15)	(0,17)
totalOCBs	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
totalNCBs	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
DeCB	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
TotalPCBs	57	100	93	84	97	88

¹ Edward. Kontaminasi senyawa poliklorobifenil (PCB) pada kerang hijau, *Perna viridis* dari Teluk Jakarta. 2016. Pusat Penelitian Oseanografi-Lembaga Ilmu Pengetahuan Indonesia (P2O-LIPI).

² Background Air Monitoring of Persistent Organic Pollutants in East Asian Countries 2014 - 2018. POPs Monitoring Project in East Asian Countries, 2020

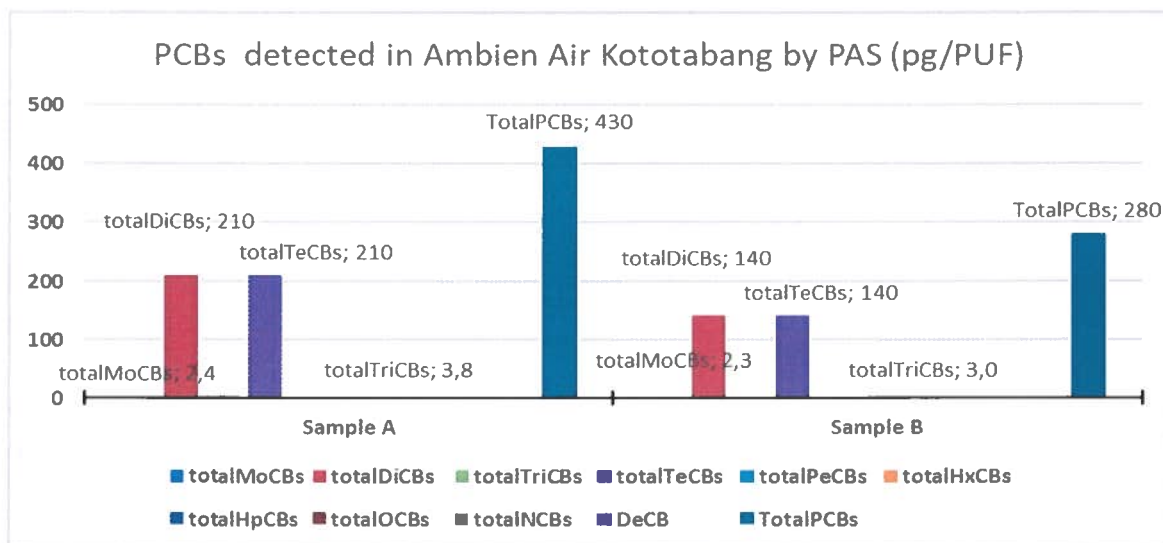


Figure 1. Concentration of PCBs in the ambient air of the Kototabang BMKG station with PAS 2018-2019 ($\text{pg}\cdot\text{m}^{-3}$)

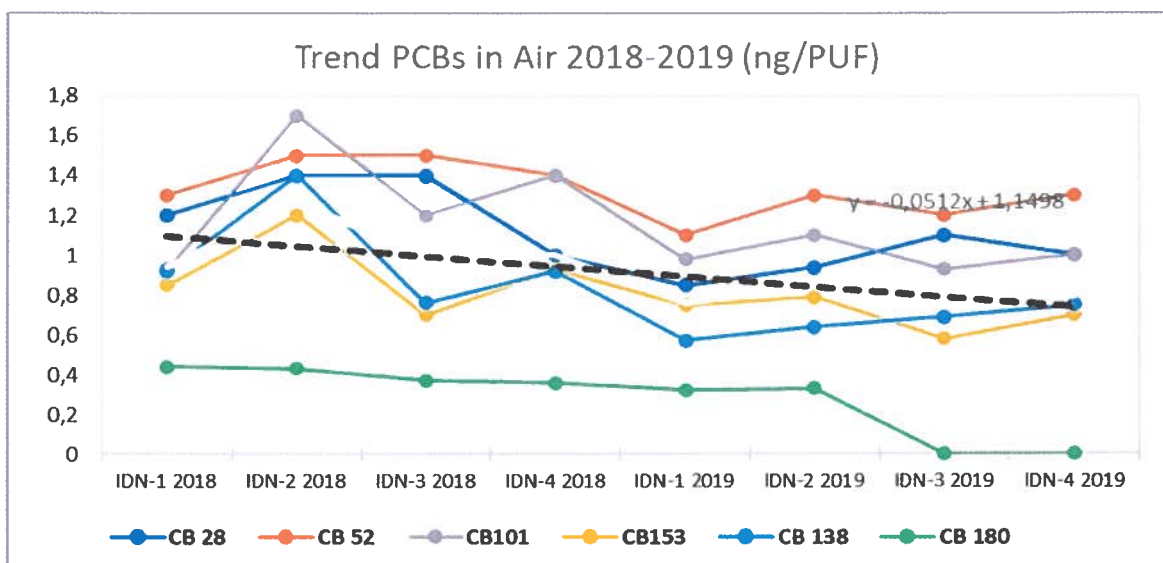
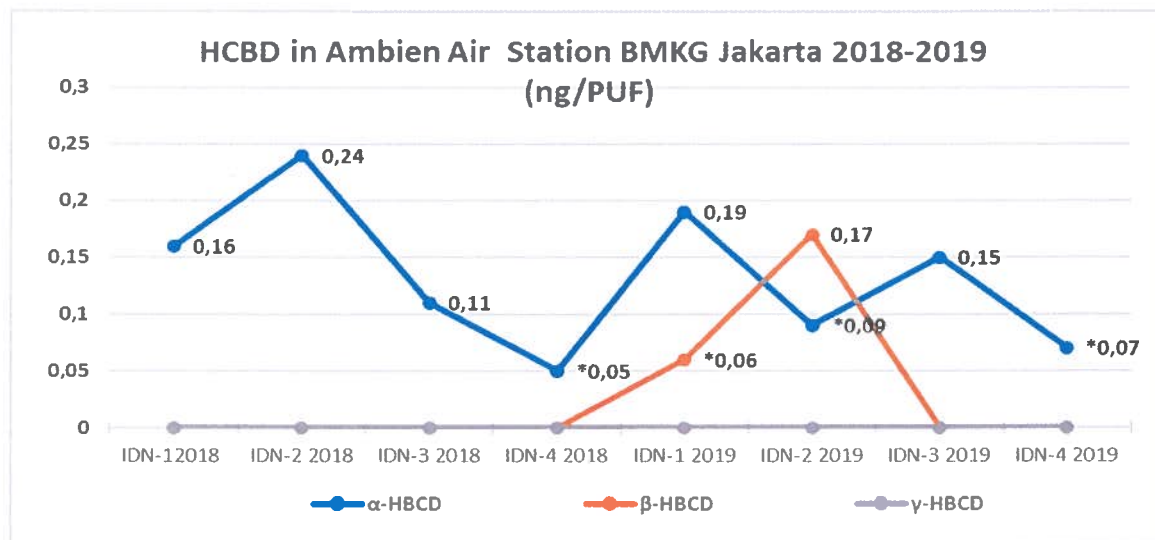


Figure 2. PCB concentration in air ambient at BMKG Jakarta Station 2018-2019 ($\text{ng}\cdot\text{PUF}^{-1}$)

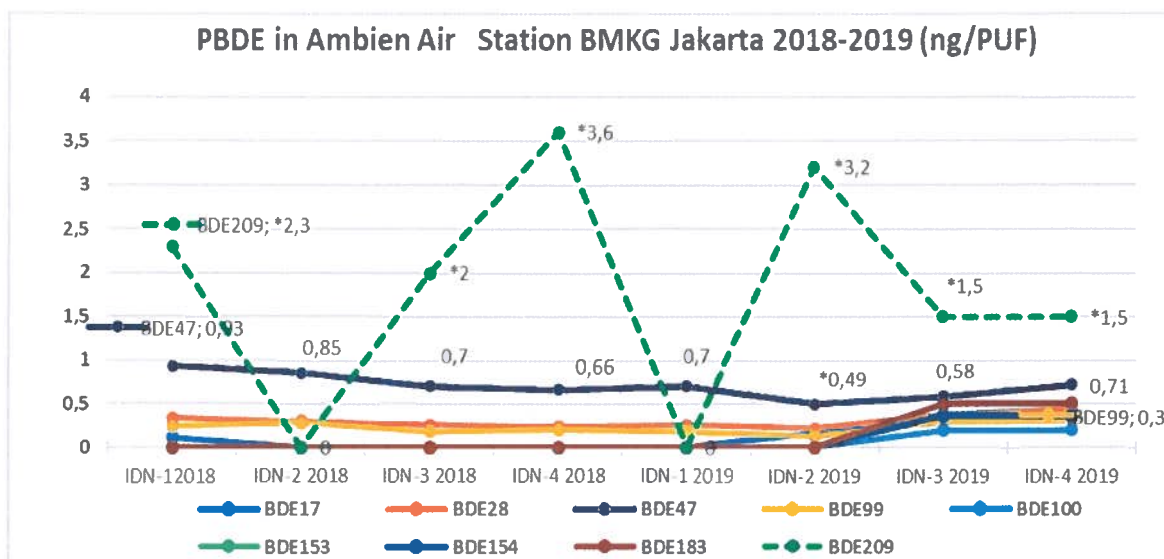
Annex 3. Results of HCBd Monitoring in the Environment



Note *: Between detection limit (LOD) and quantification limit (LOQ)

Figure 1. Concentration of HCBd in ambient air at BMKG Jakarta station 2018-2019 (ng-PUF⁻¹)

Annex 4. Results of Monitoring of PBDEs in the environment



Note *: Between detection limit (LOD) and limit of quantification (LOQ)

Figure 1. Concentration of PBDEs in the ambient air of the BMKG Jakarta station 2018-2019 (ng-PUF-¹)

Annex 5. Results of PFOS monitoring in the environment

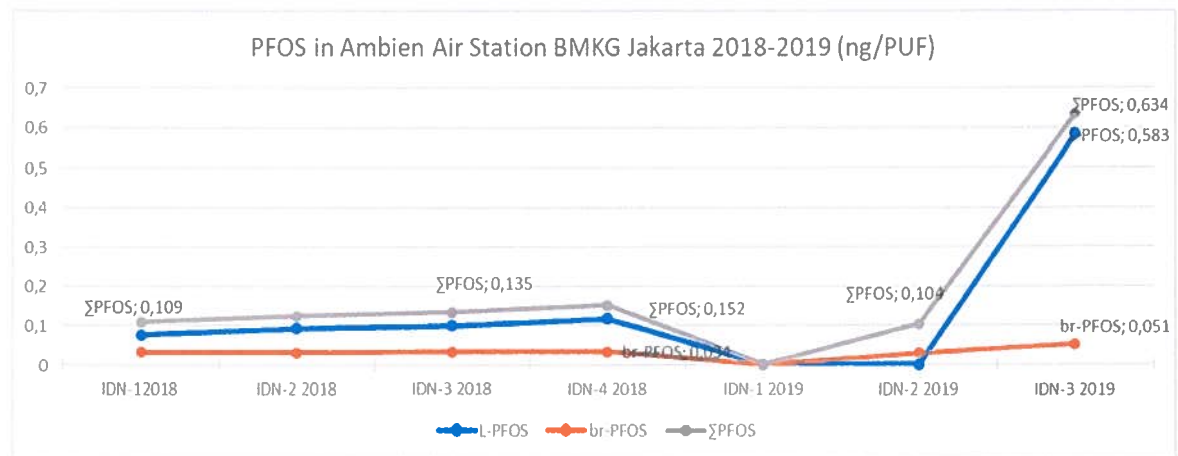


Figure 1. PFOS concentration in the ambient air of BMKG stations 2018-2019 (ng-PUF⁻¹)

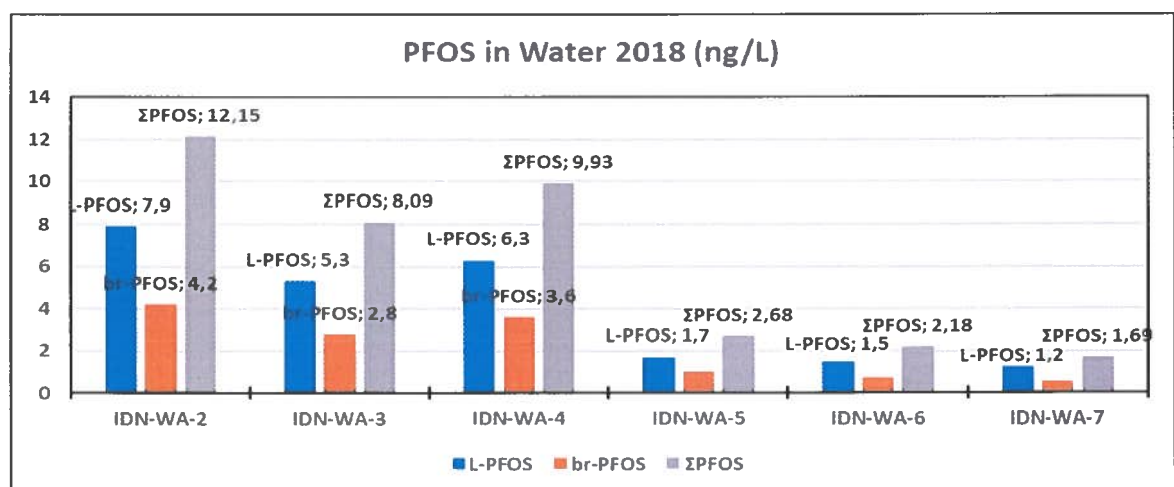


Figure 2. Detected PFOS concentrations in water in 2018 (ng-L⁻¹)