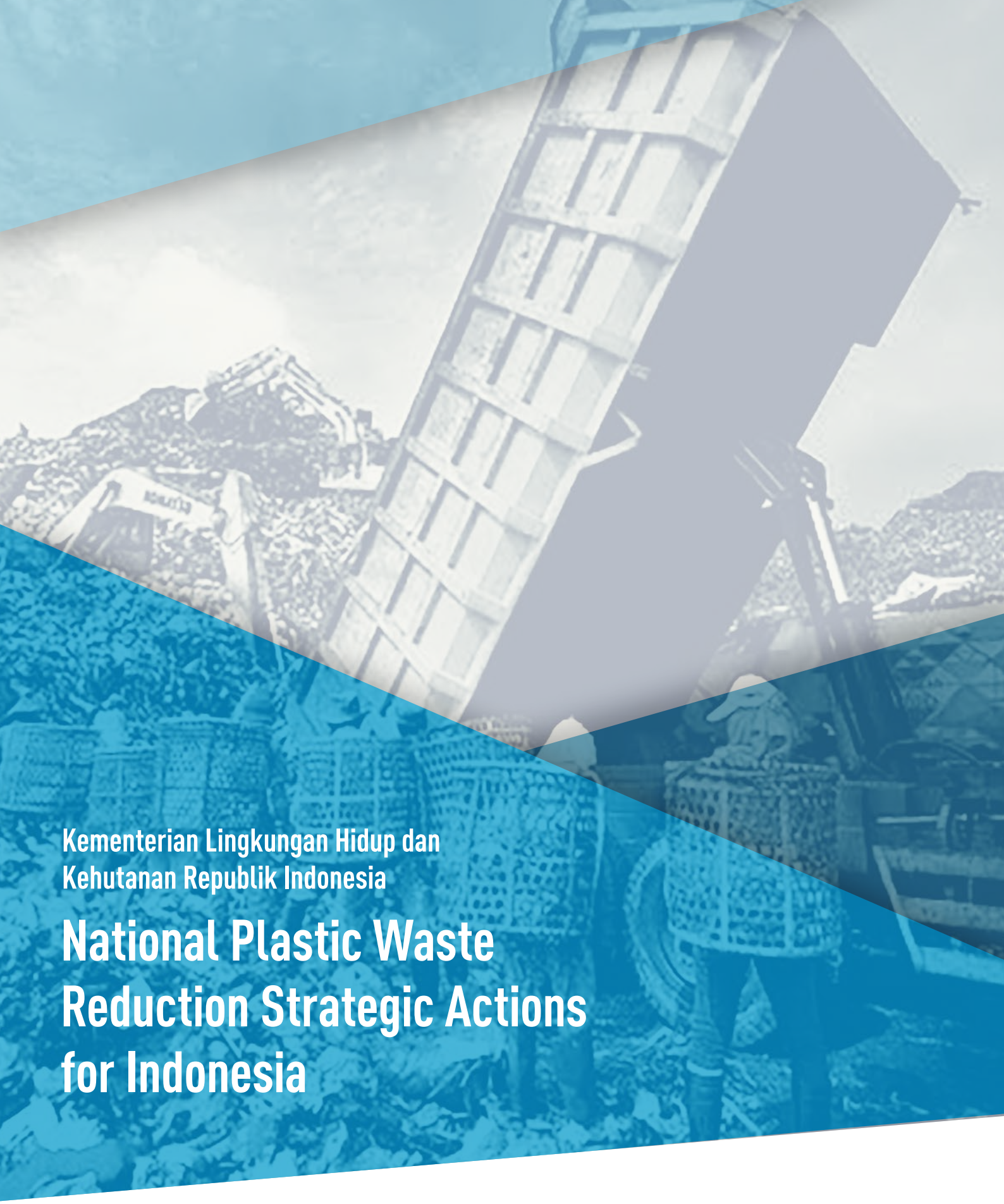

Kementerian Lingkungan Hidup dan
Kehutanan Republik Indonesia

National Plastic Waste Reduction Strategic Actions for Indonesia

KEMENTERIAN
LINGKUNGAN HIDUP DAN KEHUTANAN

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Editorial Team
Ministry of Environment and Forestry, Republic of Indonesia (KLHK):
(Rosa Vivien Ratnawati, Novrizal Tahar, Ujang Solihin Sidik)
IGES Centre Collaborating with UNEP on Environmental Technologies (CCET):
(Kazunobu Onogawa, Premakumara Jagath Dickella Gamaralalage, Tsukiji Makoto)
Sustainable Waste Indonesia (SWI): (Mohammad Helmy, Dini Trisyanti)

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National Plastic Waste Reduction Strategic Actions for Indonesia

June 2020

Acknowledgements

With a population of 250 million, Indonesia is the fourth most populous country and second-largest plastic polluter in the world after China. The country produces 3.2 million tonnes of unmanaged plastic waste a year, of which about 1.29 million tonnes ends up in the sea (Jambeck, 2015). In addition, approximately 10 billion plastic carry bags, equal to 85,000 tonnes, are released into its local environment each year (MoEF, 2018). This unmanaged plastic waste has also affected Indonesian rivers and the ocean. For example, four of the country's rivers – the Brantas, Solo, Serayu, and Progo – rank among the most polluted 20 rivers worldwide.

Given this background, the government of Indonesia recently adopted Presidential Decree No.97/2017 on National Policy & Strategy on Management of Household Waste and Household-like Waste (JAKSTRANAS), and Presidential Decree No.83/2018 on Marine Debris Management (Plan of Action on Marine Plastic Debris 2017–2025). Aiming to create an enabling environment for the implementation of these Presidential Decrees, the National Plastic Waste Reduction Strategic Actions for Indonesia (hereafter "Strategy") was formulated by the Ministry of Environment and Forestry (MoEF), the Government of Indonesia, and the IGES Centre Collaborating with UNEP on Environmental Technologies (CCET), in collaboration with Sustainable Waste Indonesia (SWI). It provides holistic and practical actions to accelerate the reduction of plastic pollution from land-based sources. In addition, MoEF and CCET have also assisted local governments in the Lake Toba region, which is one of Indonesia's 10 most important tourism destinations, to develop local waste management plans, including a response to plastic waste, to protect the environment.

MoEF and CCET would like to thank the United Nations Environment Programme (UNEP) International Environmental Technology Centre (IETC) and the Ministry of Environment, Japan (MOEJ) for their technical and financial support for the successful development of the Strategy and its implementation in Lake Toba Region.

The formulation of the Strategy was initiated through a mutual agreement between MoEF and CCET, in August 2018. During the drafting process, a series of intensive meetings were conducted among MoEF, CCET, and SWI to gather data and begin formulating the Strategy. In addition, the organisation of two national consultation meetings, in February 2019 and October 2019, with the invitation of key stakeholders in Indonesia, including line ministries, local governments, academia, NGOs, and donor agencies, resulted in inputs for finalising the Strategy. MoEF and CCET would like to acknowledge the active participation of all key stakeholders and their valuable inputs provided during the national consultations to finalise the Strategy, and make it more practical and locally applicable.

Special thanks also goes to Ms. Rosa Vivien Ratnawati, Director General, Dr. Novrizal Tahar, Director, and Mr. Ujang Solihin Sidik, Deputy Director, Solid Waste, Hazardous Waste, Hazardous Substance Management, MoEF, Mr. Kazunobu Onogawa, Director of CCET, and Dr. Keith Alverson, Director, and Mr. Shunichi Honda, Programme Officer of UNEP IETC for their commitment and leadership towards development of the Strategy and its implementation in Lake Toba. In addition, CCET team such as Dr. Premakumara Jagath Dickella Gamaralalage, Mr. Makoto Tsukiji and Ms. Miwa Tatsuno, and SWI team such as Mr. Mohammad Helmy, Ms. Dini Trisyanti, Ms. Dyota Condrorini, and others actively involved in writing the Strategy are also acknowledged for their hard work and kind contribution.

Contents

Acronyms

ADIPURA	Clean City Programme
ADUPI	Asosiasi Daur Ulang Plastik Indonesia (Indonesian Waste Recycler Association)
APDUPI	Asosiasi Pengusaha Daur Ulang Plastik Indonesia (Indonesian Plastic Recyclers Association)
ASOBSI	Asosiasi Bank Sampah Indonesia (Indonesian Waste Bank Association)
BOPET	Biaxially-oriented Polyethylene Terephthalate
BPS	Badan Pusat Statistik (Nationel Statistic Bureau)
CPP	Cast Polypropylene
EPR	Extended Producer's Responsibility
FMCG	Fast-Moving Consumer Goods
INAPLAS	Asosiasi Industri Olefin, Aromatik & Plastik Indonesia
IPI	Ikatan Pemulung Indonesia (Indonesian Scavengers Association)
IP2WM	Indonesia Partnership on Plastic Waste Management
JAKSTRANAS	Kebijakan dan Strategi Nasional (National Waste Management Policy and Strategy)
Keppres	Keputusan Presiden (Presidential Decree)
MoEF	Ministry of Environment and Forestry
MoI	Ministry of Industry
MRF	Material Recovery Facility
MSW	Municipal Solid Waste
Mt	Million (metric) tonnes
Pergub	Peraturan Gubernur (Governor's Regulation)
Perpres	Peraturan Presiden (Presidential Regulation)
Perwali	Peraturan Walikota (Mayor's Regulation)
PET	Polyethylene Terephthalate
PP	Peraturan Pemerintah (Government Regulation)
PP	Polypropylene
PVC	Polyvinyl Chloride
SIPSN	Sistem Informasi Pengelolaan Sampah Nasional (National Solid Waste Management Information System)
SUP	Single-Use Plastic
SWM	Solid Waste Management
TPA	Indonesian Final Disposal Sites (central open dump sites or landfills)
TPS	Indonesian Temporary Disposal or Dump Sites
TPS3R	Tempat Pengolahan Sampah - Reduce, Reuse, Recycle (Solid Waste Processing Centre - 3R)
TPST	Indonesian Intermediate Transfer Facilities

Foreword

We are glad to acknowledge the final version of the National Plastic Waste Reduction Strategic Actions for Indonesia, a collaborative work between the Directorate of Solid Waste Management, Director General for Solid Waste, Hazardous Waste, and Hazardous Substance Management, Ministry of Environment and Forestry, Republic of Indonesia, along with Sustainable Waste Indonesia (SWI) and the IGES Centre Collaborating with UNEP on Environmental Technologies (CCET).

Since plastic pollution is a serious emerging issue, both globally and nationally, and needs to be tackled comprehensively through multi-stakeholder collaboration, this document is one of our efforts to provide a platform and strategy to reduce plastic waste in an integrated manner, from upstream, to midstream, to downstream, based on the waste hierarchy principle. This strategy and actions are intended to serve as one of the national references for how Indonesia can fulfill its national solid waste management targets, i.e. to reduce solid waste from its source by 30%, and to properly handle 70% of solid waste by 2025, 70% of marine plastic litter by 2025 from 2017.

In December 2019, we proudly published Ministry of Environment and Forestry Regulation No. P.75/2019 concerning Roadmap of Waste Reduction by Producer, and which can be referred to as the Roadmap of EPR in Indonesia. The objective of the roadmap is to guide and facilitate the producers, including brand owners, manufacturers, importers, retailers, and the food and beverage service industry, to implement their responsibility on reducing the waste generated from their goods, packaging, and services in form of plastics, paper, aluminum cans, and glass. The three components for how producers reduce their waste are as follows:

1) To prevent and limit the potential of waste generation as much as possible by implementing design for sustainability (DfS) in the form of re-designed products and packaging, by phasing-out single-use plastics, eliminating unnecessary and excessive packaging, making packaging more recyclable and reusable, creating packaging out of more recycled content, as well as producing more durable, returnable, rechargeable, and refillable goods;

2) To take back post-consumer products and packaging for reuse; and

3) To take back post-consumer products and packaging for recycling.

We do hope this document could be a perfect complement to our EPR Roadmap implementation that will start this year.

Lastly, I would like to express my appreciation to Sustainable Waste Indonesia (SWI) and the IGES Centre Collaborating with UNEP on Environmental Technologies (CCET), for their formulation and finalisation of this document. We thank you for your support and collaboration, and we hope we could continue our partnership in the future.

Dr. Novrizal Tahar
Director of Solid Waste Management,
Director General for Solid Waste, Hazardous Waste, and Hazardous Substance Management,
Ministry of Environment and Forestry,
Republic of Indonesia

Executive Summary

Solid waste management continues to be a huge challenge in Indonesia. In 2017, the country's waste generation reached 65.8 million (metric) tonnes (Mt), and it is estimated to grow at a significant rate for the foreseeable future. In addition, the rate of increase of solid waste management infrastructure cannot keep up with the waste generation. As a result, a huge amount of unhandled waste is polluting Indonesian land and rivers, as well as the ocean.

Solid Waste Management Act (No. 18/2008) was issued to bring about the improvement of solid waste management in Indonesia, including the cessation of all open dump waste disposal by 2013. The ambitious target was not achieved, as the Ministry of Environment and Forestry recently recorded that 167 open dump waste disposal facilities remain in operation (SIPSN, 2018). The waste collection rate in Indonesia also remains low.

Furthermore, there is increasing global concern about plastic pollution, and Indonesia is branded as the second largest ocean plastic polluter. It was estimated that 0.27–0.59Mt of plastic waste was discharged into Indonesian ocean (Indonesia Institute of Science, 2018). Meanwhile, the waste recycling rate in Indonesia, which largely relies on informal sector, captures less than 5% of waste generated (World Bank, 2018), with a plastic recycling rate of only 7% (Danone Infinity Report, n.d.). This is worsened by the fact that plastic and plastic recycling industries are mostly available in the country's western islands, Java and Sumatera. However, plastic waste constitutes about 10.6% of total waste generation nationwide (SIPSN, 2018). There is a significant opportunity to strengthen the recycling industry in Indonesia and therefore, reduce and eliminate plastic pollution on its land and in neighboring waters.

The plastic industry is growing significantly in Indonesia, though present plastic consumption of 22.54 kg/capita/year is lower than consumption in other Southeast Asian countries (Malaysia, Singapore, and Thailand all have rates of >60 kg/capita/year). The food and beverage industry is the major plastic user in Indonesia (60% of plastic production), utilising various polymers (PET, PE and PP). The plastic recycling system for some types of plastic materials is quite established. However, data obtained from the National Food and Drug Agency shows that a majority of the products used as a plastic packaging are still considered to be low value and difficult to recycle, thereby leading to a lower recycling rate.

Various efforts to restrict the use of plastics have now begun to be implemented. Derived from the act that regulates overall waste management, Presidential Regulation No. 97/2017 (JAKSTRANAS) regulates policies and strategies on management of household waste and household-type waste. It sets the target of 30% waste reduction and 70% waste handling by 2025. Further, plastic waste management is also included in Presidential Regulation No. 83/2018 on Marine Debris Management, and a regulation on Extended Producers Responsibility is currently being formulated. The government also started to handle plastic waste trade through ministerial-level laws. At the local level, governments have started to issue requirements limiting single plastic uses.

Waste management related regulations in Indonesia

National Law	Act No. 18/2008 on Solid waste management		Act No. 32/2009 on Environmental Protection and Management		
Government Regulation	PP No. 81/2012 Government Regulation on Management of Household and Household-like Waste	PP No. 101/2014 Government Regulation on Hazardous Waste Management	**DRAFT** Government Regulation on Excise on Plastic	**DRAFT** Government Regulation on Specific Waste Management	
Presidential Regulation	Perpres No. 97/2017 Presidential Regulation on National Policy and Management Strategy of Household Waste and Household-like Waste	Perpres No. 83/2018 Presidential Regulation on Marine Debris Management	Perpres No. 18/2015 Presidential Regulation on Income Tax Facilities for Investment in Certain Business Fields and/or in Certain Regions	Perpres No. 15/2018 Presidential Regulation on Acceleration of Damage and Pollution Control on Citarum River Basin	Perpres No. 35/2018 Presidential Regulation on Acceleration of Development of Waste-to-Energy Installation using Environmentally-sound Technology
Presidential Decree	Keppres No. 61/1993 and No. 47/2005 Presidential Decree on Ratification of the Basel Convention on the Control of the Transboundary Movement of Hazardous Waste and Their Disposal				
Ministerial Regulation	Ministry of Trade Regulation No. 31/2016 on Non-Hazardous Waste Import	Ministry of Public Works Regulation No. 3/2013 on Implementation of Solid Waste Infrastructure and Facilities	Ministry of Trade Regulation No. 48/2015 on General Provisions in the Import Sector	Ministry of Trade Regulation No. 70/2015 on Importer Identification Number	Ministry of Industry Regulation No. 48/2015 on Requirements for Income Tax Facilities Implementation
	Ministry of Environment and Forestry Regulation No. P.75/2019 on Roadmap to Waste Reduction by Producers		**DRAFT** Ministerial Regulation (MoEF) on Shopping Plastic Bag Reduction		
Local Regulation	Regional/Local Regulations on Single-use Plastic Bans; 3 provinces and 28 municipalities as of December 2019 (Provincial level) Pergub Bali No.97/2018, Pergub DKI Jakarta No.142/2019, Surat Edaran Yogyakarta No.490/1758 (Municipal level) Perbup Kabupaten Purwakarta No.37/2016, Peraturan Bupati Badung No.47/2018, Peraturan Bupati Hulu Sungai Utara No.8/2019, Peraturan Bupati Biak Numfor No.28/2019, Peraturan Bupati Bogor No.13/2019, Peraturan Bupati Nunukan No.32/2019, Peraturan Bupati Nunukan No.45/2019, Instruksi Bupati Tulungagung No.2/2019, Peraturan Bupati Pati No.33/2019, Peraturan Bupati Merauke No.23/2019, Peraturan Daerah Bandung No.17/2012, Perwali Bandung No.37/2019, Perwali Banjarmasin No. 18/2016, Peraturan Daerah Balikpapan No.1/2019, Perwali Balikpapan No.28/2019, Perwali Bogor No.61/2018, Perwali Jambi No.61/2018, Perwali Denpasar No.36/2018, Perwali Banjarbaru No.66/2016, Perwali Bukittinggi No.28/2018, Perwali Sam				

Reliance on plastic, particularly in packaging, is inevitable due to its lightness, flexibility and ability to protect materials from contamination and very low price. While research on plastic substitutes can possibly be the answer to reducing plastic waste in the long run, the current problem of plastic waste must also be dealt with.

The challenges for improvement of waste management

Regulation and Institutional	Financial	Social	Infrastructure
Business-to-business scheme or zoning for solid waste management Partnership in data and information management on plastic waste	Effective and efficient funding for solid waste management Public-private partnership in solid waste management	Behaviour change communication, information and education on household waste management	Improvement of solid waste management infrastructure Strengthening the recycling industry - as close to the waste source as possible - ensure offtaker of recycling products EPR implementation - producers redesign their packaging, including using recycled content in their packaging - proper take back collection system - promote sustainable alternatives for plastic packaging

1 Introduction and Background

1-1. Background

Global concern about marine plastic pollution is based on environmental and marine ecosystem concerns, including marine life, as well as economic and human health impacts. As of 2015, approximately 6,300Mt of plastic waste had been generated worldwide to date, around 9% of which had been recycled, 12% incinerated, and 79% either dumped in landfills or accumulated in the natural environment[1]. If current production and waste management trends continue, roughly 12,000Mt of plastic waste will end up in landfills or the natural environment by 2050[2]. The economic loss due to the marine plastic pollution is estimated at USD 14 billion annually due to damaged fisheries and reduced tourism[3]. The Sustainable Development Goals target 12.4 and target 14.1 highlight the prevention and reduction of all kinds of marine pollution, in particular from land-based activities including waste management. Recent studies such as Schmidt[4] and Jambeck[5] show that the Asian region, and especially Southeast Asia, is believed to have become a major hotspot for plastic leakage into the ocean. These studies highlighted that about 8–10Mt of plastic debris is entering the oceans annually and 70–80% of the quantity is generated on land and transported by rivers and a variety of surface water flows. As a result, there are a growing number of national and regional movements the world over dedicated to tackling plastic pollution through enhancement of circular economy, 3Rs, waste management systems, and clean-up activities, including the following policy arrangements among stakeholders:

- National and local governments are encouraged to develop legal frameworks and incentives, adopt waste management plans, and take other actions.
- More and more countries are developing their own strategy and plans on plastic circular economy, including plastic waste management.
- Research organisations and the private sector are each expected to develop innovative solutions to tackle marine litter and microplastics.
- More than 60 countries have taken steps to ban or reduce single-use plastics, such as plastic shopping bags, plastic utensils, and straws.

In addition, the fourteenth meeting of the Conference of the Parties to the Basel Convention (BC COP-14) was held in May 2019, with the adoption of 29 decisions. Some of its main outcomes included amendments to the annexes to the Basel Convention related to plastic waste[6], regulated as hazardous (Annex VIII), non-hazardous (Annex II), contaminated (Annex IX), and tradable without regulations (Annex IX). The fourth session of the United Nations Environment Assembly (UNEA 4), held in March 2019, also included a number of highlights, as follows:

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1 Geyer, Jambeck, and Law, 2017
2 Production, use, and fate of all plastics ever made, Geyer, et al., Law Sci. Adv. 2017
3 OECD report, 2018
4 Export of Plastic Debris by Rivers into the Sea, Schmidt, et al., Environ. Sci. Technol., 2017
5 Plastic waste inputs from land into the ocean, Jambeck, et.al Science, 2015
6 http://www.basel.int/TheConvention/ConferenceoftheParties/Meetings/COP14/tabid/7520/Default.aspx

(In the Ministerial Declaration)

- *We will address the damage to our ecosystems caused by the unsustainable use and disposal of plastic products, including by significantly reducing the manufacturing and use of single-use plastic products by 2030, and we will work with the private sector to find affordable and environmentally friendly alternatives.*

(Related to Marine Plastic Litter and Microplastics)

- *The United Nations Environment Assembly, noting with concern that the high and rapidly increasing levels of marine litter, including plastic litter and microplastics represent a serious environmental problem at a global scale, negatively affecting marine biodiversity, ecosystems, animal well-being, societies, livelihoods, fisheries, maritime transport, recreation and tourism, and economies,*

- *Stressing further the importance of a more sustainable management of plastics throughout their lifecycle in order to increase sustainable consumption and production patterns, including but not limited to circular economy and other sustainable economic models, and the importance of environmentally sound waste management, resource efficiency, the 3Rs (Reduce, Reuse, Recycle), sustainable materials management innovation of related technologies, environmentally sound clean-up of marine plastic litter, and international cooperation, to most effectively prevent pollution from marine litter including plastic litter and microplastics,*

- *Stressing as well the urgent need to strengthen the science-policy interface at all levels and to do more to support science based approaches, improve understanding of the fate, distribution and impacts of marine litter including plastic litter and microplastics on the marine environment and promote local, national, regional and global action on preventing and eliminating discharge of litter, including plastic litter and microplastics into the marine environment,*

(Addressing Single-use Plastic Products Pollution)

- *Mindful that while plastic plays an important role in the economy, plastic packaging accounts for about half of the plastic waste in the world, and that its mismanagement leads to a loss of resources and value as well as affects the environment,*

- *Alarmed by the serious environmental, social, and economic impacts of plastic waste/ pollution including blocking waterways and clogging sewers and providing breeding grounds for mosquitoes and pests, and blocking animal airways and stomachs among others, as well as the health impacts of poor solid waste management practices,*

- *Noting the important role of key sectors such as plastics producers, retailers and the consumer goods industry, as well as importers, packaging firms, transport firms, and recyclers to contribute to the reduction of plastic waste, arising from their products and activities, as well as to provide information on the impacts arising from their products and encourages innovative approaches such as the use of EPR schemes, deposit refund schemes and other initiatives*

1-2. Indonesian Context

Jambeck et al. (2015) reported that Indonesia is the country dumping the second largest amount of plastic waste into the world's oceans, with its estimate of 3.22Mt of plastic waste annually. China is first, with 8.82Mt of plastic waste flowing into the oceans. In addition, the crisis of plastic waste is not just limited to the oceans, but it has also affected Indonesian rivers. Data from Nature Communications revealed that four of Indonesia's rivers – the Brantas, Solo, Serayu and Progo – rank among the 20 most polluted rivers in the world (The ASEAN Post, July 2017). Indonesia has been tackling challenging issues on waste management, the following are the main policy arrangements on plastic waste management, and "National Plastic Waste Reduction Strategic Actions for Indonesia" should be in line with those of policies (Fig. 1).

- No. 18/2008 Waste management law (Basic Law on waste management)
- Presidential decree No.97/2017 on National Policy & Strategy on management of household waste and household-like waste (JAKSTRANAS)
- Presidential decree No.83/2018 on Marine Debris Management (National Plan of Action on Marine Plastic Debris)
- Government decree No. 81/2012 on waste management of household waste and household-like waste including waste management policy and strategy and its implementation as an enforcement order of the No. 18/2008
- MoEF decree No.13/2012 on Guidelines for implementation of Reduce, Reuse and Recycle through Waste Bank
- MoEF decree No. P.75/2019 on Roadmap to Waste Reduction by Producers
- MoEF decree on restricted single plastic use (On-going)

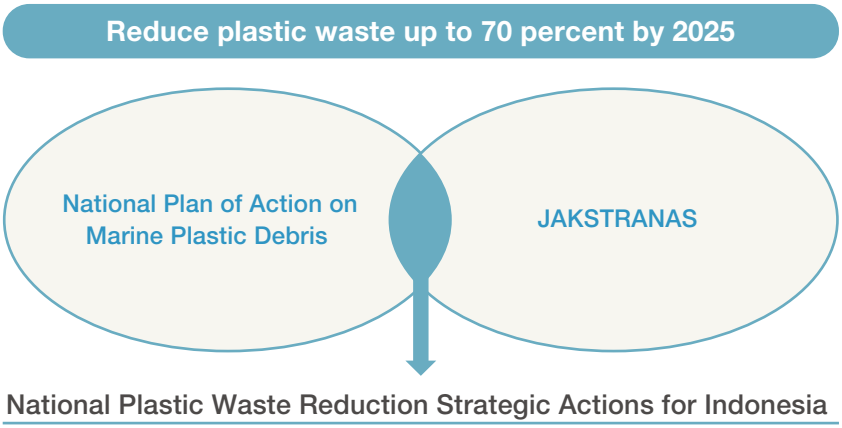


Fig. 1 Law & Regulation on Waste Management in Indonesia

The Indonesia Marine Debris Hotspot Rapid Assessment Synthesis Report, developed by World Bank in April 2019, also showed the following findings:

- *Identify the main waste leakage points or 'hotspots' along each city's central waterways,*
- *Identify significant gaps in several locations across all cities where provision of appropriate waste collection receptacles (and frequency of service) and signage are not available or insufficient, and where community sensitisation and behavioural change campaigns are needed to halt illegal dumping and development of waste hotspots along waterways,*
- *Underscore the need to tailor remediation strategies to city-specific operating environments*

Based on the above context, MoEF developed the "National Plastic Waste Reduction Strategic Actions for Indonesia" in collaboration with the IGES Centre Collaborating with UNEP on Environmental Technologies (CCET) and Sustainable Waste Indonesia (SWI), and funded by the Ministry of Environment, Government of Japan through UNEP IETC, to achieve the national target of plastic reduction of 70% by 2025.

2 National Overview of Plastic Waste Management

2-1. National Law, Regulation and Programme

Table 1 shows a summary of national waste management regulations in Indonesia. Waste Management Law No. 18/ 2008 has been issued by the Government of Indonesia as an umbrella for national waste management policy and practice in Indonesia.

Plastic waste is regulated under various government regulations, presidential-level regulations, including presidential-level regulations. With the recent increase in concern over plastic pollution, particularly caused by plastic packaging, many regions issued regulations on banning plastics. Furthermore, the national government has just formulated a regulation on EPR in December 2019. (MoEF Regulation No. P.75/2019 on Roadmap to Waste Reduction by Producers)

Table 1. Summary of National waste management regulations in Indonesia (as of Aug 2019)

Ministry of Environmental and Forestry
Ministry of Public Works
Ministry of Trade
Ministry of Industry

National Law	UU No. 18 / 2008 Law on Solid Waste Management	UU No. 32/2009 Law on Environmental Protection and Management			
Government Regulation	PP No. 81/2012 Government Regulation on Management of Household and Household-like Waste	PP No. 101/2014 Government Regulation on Hazardous Waste Management	DRAFT Government Regulation on Excise on Plastic	DRAFT Government Regulation on Specific Waste Management	
Presidential Regulation	Perpres No. 97/2017 Presidential Regulation on National Policy and Management Strategy of Household Waste and Household-like Waste	Perpres No. 83/2018 Presidential Regulation on Marine Debris Management	Perpres No. 18/2015 Presidential Regulation on Income Tax Facilities for Investment in Certain Business Fields and/or in Certain Regions	Perpres No. 15/2018 Presidential Regulation on Acceleration of Damage and Pollution Control on Citarum River Basin	Perpres No. 35/2018 Presidential Regulation on Acceleration of Development of Waste-to-Energy Installation using Environmentally-sound Technology
Presidential Decree	Keppres No. 61/1993andNo.47/2005 Presidential Decree on Ratification of the Basel Convention on the Control of the Transboundary Movement of Hazardous Waste and Their Disposal				
Ministerial Regulation	Ministry of Trade Regulation No. 31/2016 on Non-Hazardous Waste Import	Ministry of Public Works Regulation No. 3/2013 on Implementation of Solid Waste Infrastructure and Facilities	Ministry of Environment and Forestry Regulation No. P.75/2019 on Roadmap to Waste Reduction by Producers	DRAFT Ministerial Regulation (MoEF) on Shopping Plastic Bag Reduction	
	Ministry of Trade Regulation No. 48/2015 on General Provisions in the Import Sector	Ministry of Trade Regulation No. 70/2015 on Importer Identification Number	Ministry of Industry Regulation No. 48/2015 on Requirements for Income Tax Facilities Implementation		
Regional/Local Regulation	Regional/Local Regulations on Single-use Plastics Ban: - Pergub Bali No. 97/2018	- Perwali Denpasar 36/2018 - Perwali Bogor 61/2018 - Perwali Banjarmasin 18/2016	- Perwali Balikpapan 8/2018 - Perwali Padang 36/2018 - Perda Purwakarta 37/2016		

(Source: SWI analysis, 2019)

In order to support the enhancement of solid waste management and achieve overall environmental improvement, the government has implemented various programmes (Fig. 2). One of them targeted discouragement of the use of plastic bags by applying an additional charge for them, and in September 2019, MoEF launched the "Waste Sorting Movement (*Gerakan Pilah Sampah*)" to encourage more source separation and promote circular economy. Further, the government has trialed implementation of a recyclables collection model (such as PET bottle, cartons) in several areas. In addition, MoEF has carried out several collaborations concerning pollution and the control of coastal and ocean damage, including that caused by waste. These include a Memorandum of Understanding (MoU) with Seven ministries/institutions for ocean plastic waste observation. A total of 20 locations were observed in 2019, and it will be carried out in 34 provinces in 2020. The observations are made not only for domestic waste but also for waste coming from farms, industries, and other land-based activities.

The Indonesian government is also collaborating with ASEAN, through the formation of work groups concerning ocean waste disposal. Furthermore, there are many programme conducted by local governments. For example, Bogor issued Regent Regulation No.13/2019 concerning Plastic and Styrofoam Usage Reduction, and ARTIS Application to find out waste reduction data and plastic management pilot project with cement factories in 2019. The ADIPURA has also been implemented as an incentive for any municipality that excel in environmental management and city cleanliness. There are four categories of ADIPURA's participating municipalities: metropolitan city, big city, medium city and small city. The Government of Indonesia has also started formulating additional regulations, i.e. those concerning EPR and limitation of single-use plastic bags, as part of the efforts to reduce waste (in line with the target stipulated in the National Strategy), particularly plastic waste.

Fig. 2 National waste management programmes – MoEF (Source: SWI analysis, 2019)

Fig. 3 and Table 2 show plastic waste reduction projection estimates by MoEF during the discussion on development of the EPR regulation. The data on waste generation projection is based on the JAKSTRANAS. The composition of plastic waste, the baseline recycling rate, and the annual increase in the recycling rate are estimated at 14%, 7% and 2% respectively. The main target of the EPR is a "take-back mechanism", where producers are responsible for recovering their packaging wastes.

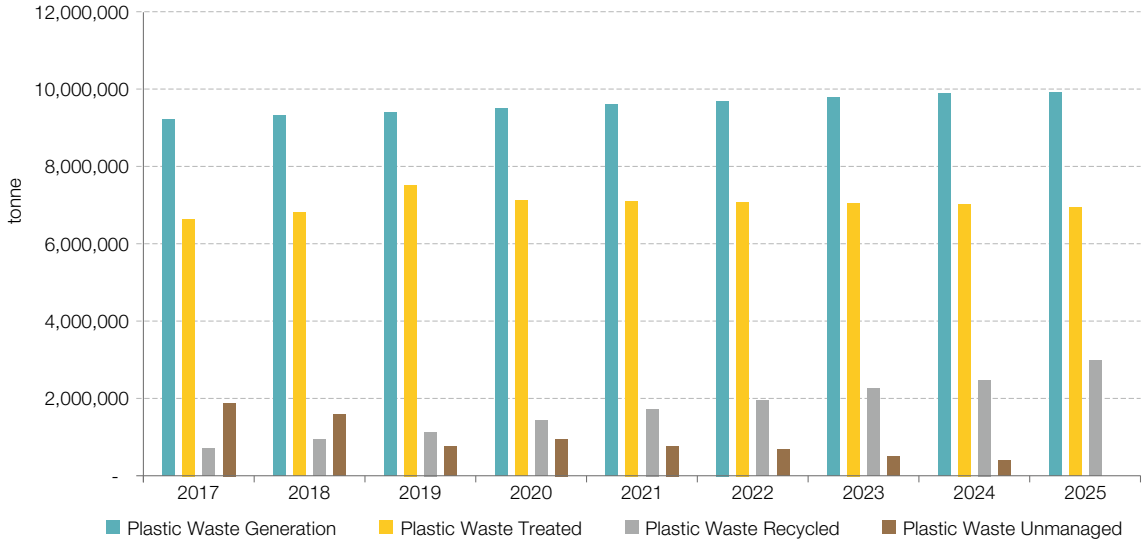


Fig. 3 Plastic waste reduction projection through EPR 2017–2025 (KLHK, 2018)

(Source: SWI analysis from MoI data, 2019)

Table 2. Plastic waste reduction projection through EPR 2017–2025 (KLHK, 2018)

Year	Waste generation projection (tonne)	Plastic waste generation projection (tonne)	Target Plastic Waste Reduced through EPR effort (tonne)
2017	65,800,000	9,212,000	700,112
2018	66,500,000	9,310,000	931,000
2019	67,100,000	9,394,000	1,127,280
2020	67,800,000	9,492,000	1,423,800
2021	68,500,000	9,590,000	1,726,200
2022	69,200,000	9,688,000	1,937,600
2023	69,900,000	9,786,000	2,250,780
2024	70,600,000	9,884,000	2,471,000
2025	70,800,000	9,912,000	2,973,600

(Source: SWI analysis from MoI data, 2019)

Fig. 4 shows the roadmap of plastic industry development estimated by the MoI. The graph shows an expected significant increase in plastic consumption over the next 15 years, which means that plastic production is expected to grow to meet the demand for plastic. While there is an estimation for increased plastic production, the MoI has not considered growth in the plastic recycling industry. Further, there is no target for "recycled content" in plastic production, such as plastic waste recycling that uses a certain percentage of recycled raw materials to make plastic products.

Ministry of Industry

Capacity = 5.33–7.09 million tonnes
Plastic production (2015–2019) = 4.68–6.23 million tonnes
Plastic consumption (2015–2019) = 17–23 kg/capita/year

Capacity = 7.80–11.43 million tonnes
Plastic production (2020–2024) = 6.85–10.03 million tonnes
Plastic consumption (2020–2024) = 25–40 kg/capita/year

Capacity = 12.57–32.60 million tonnes
Plastic production (2025–2035) = 11.04–28.62 million tonnes
Plastic consumption (2025–2035) = 44–100 kg/capita/year

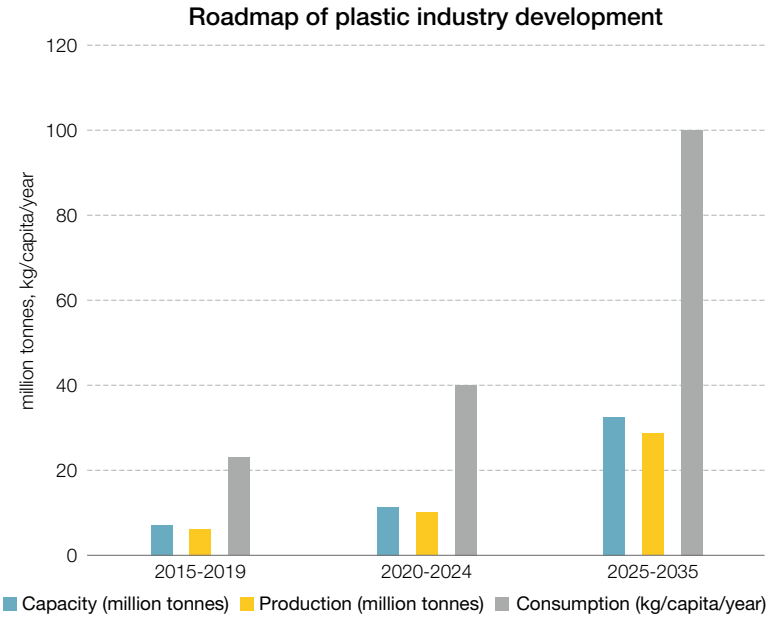


Fig. 4 Plastic industry development in Indonesia
(Source: Directorate for Downstream Chemical and Pharmaceutical Industry, MoI (2019). *Policy of National Plastic Industry.* Presented at Seminar Peran Industri Daur Ulang Plastik Sebagai Upaya Pengurangan Sampah Plastik di Indonesia 7 February 2019, Jakarta)

In addition, some regulations and programmes for the plastic industry have been implemented by the MoI:

- Tax allowance for the plastic industry
  This is based on Perpres No. 18/2015 and MoI regulation No. 48/2015 (Table 3)

Table 3. Tax allowance for the plastic industry

Business field	Standard Field of Business Classification Number (2009)	Products	Criteria
Artificial Resin Industry (Synthetic Resin) and Plastic Raw Materials	20131	Polycarbonate, Polybutene, Polyacetol, Nylon filament yarn, Nylon tire cord, Polyethylene, Polypropylene, Poly vinyl chloride, Polyurethane, Super absorbant polymer, Polyesther chip (PET resin)	• Investment ≥ Rp 100 M • Manpower ≥ 50 people

(Source: SWI analysis from MoI presentation, 2019)

➤ Government-borne import duty facilities applied for plastic industries

The government supports plastic industries to fulfill the supply of goods or services for the public needs and interests, and to increase competitiveness, employment, and country's income as well. The following plastic items are targeted: *plastic packaging, plastic sheets, BOPET films, CPP films, plastic sacks, plastic pellets, plastic bottles and jerry cans, plastic tarps, geotextiles, goods and/or furniture from plastics.*

➤ Bea Masuk Anti Dumping
(Anti Dumping Import Duty) for plastic products

This is applied as follows;

- Biaxially-oriented Polyethylene Terephthalate (BOPET)
  Valid for 5 years (2015–2020): Applied for products from India, China, Thailand
- Biaxially Oriented olypropylene (BOPP)
  Valid for 2 years (2016–2018): Applied for products from Thailand, Vietnam

2-2. Solid Waste Management in Indonesia

The general flow of municipal solid waste management in Indonesia is shown in Fig. 5 Responsibilities for specific stages of waste service provision are as follows:

- Collection and transport of household waste to Temporary Disposal Sites (TPS) or Intermediate Transfer Facilities (TPST) are the responsibility of the neighborhood and community organisations (RT/RW).
- Transport of waste from the TPS/TPST to the Landfill (TPA) is the responsibility of local governments.
- Collection and transport of waste from the source to the TPS/TPST, or directly to the TPA, is the responsibility of the generators (residential, commercial or industrial).
- Collection and transport of waste from public and social facilities is the responsibility of local government.
- Institutional oversight differs for the management of the solid waste from household and in waterways. MSW management is typically done by the Cleansing Department (Seksi Kebersihan) of each district, with household level collection delegated to the lowest levels of government. On the other hand, managing MSW in waterways is handled by different departments, depending on the city.

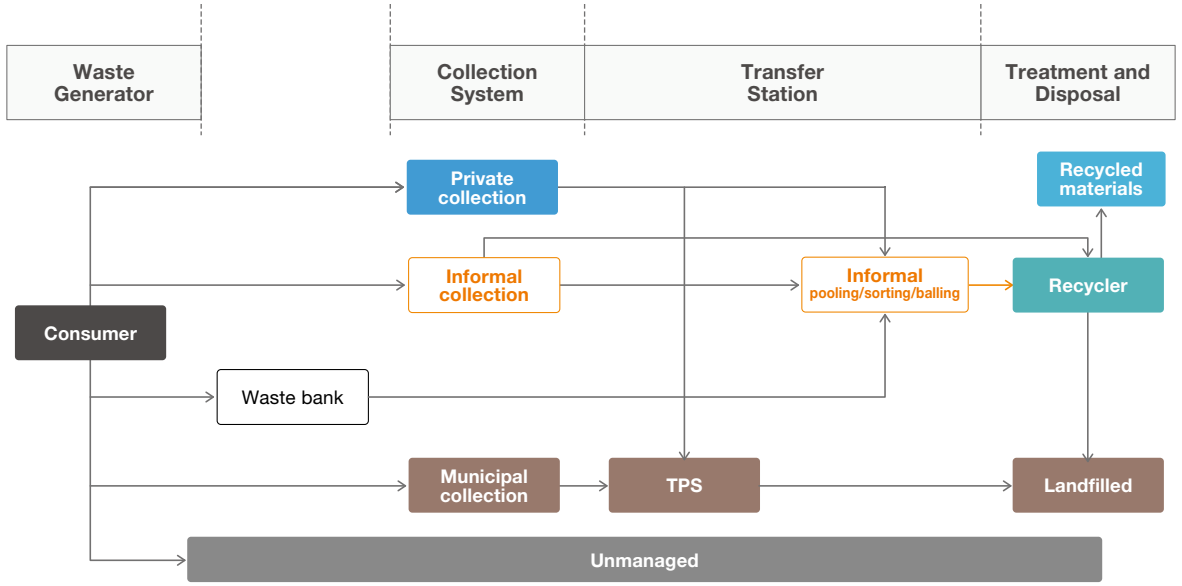
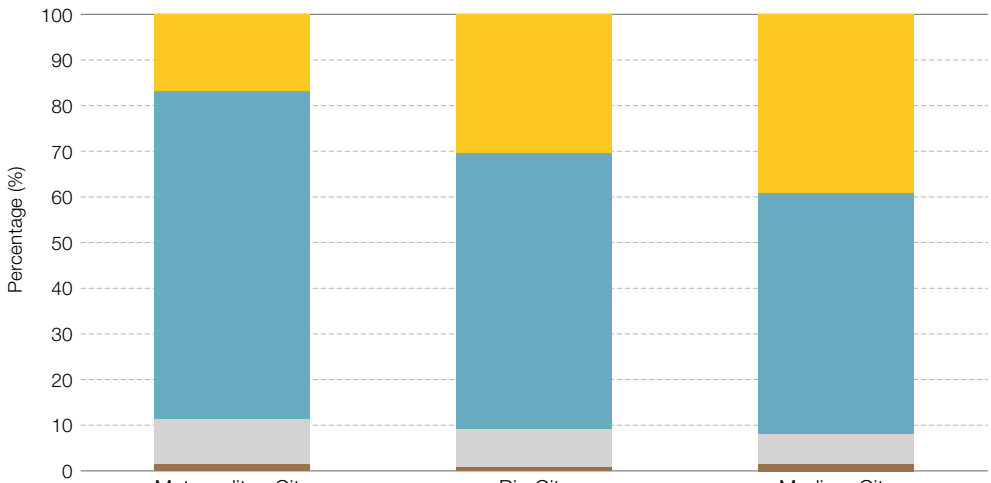


Fig. 5 Municipal solid waste management flow in Indonesia (Source: SWI)

Solid Waste Management Performance

Based on the ADIPURA Programme (Fig. 6), metropolitan and big cities have relatively good collection rates, but those of medium and small cities are considerably lower. This data is basically a self-report by municipalities. Improved access of municipal waste services in peri-urban, rural areas, and small islands with medium and small cities is crucial for reducing waste leakage into the environment.



	Metropolitan City	Big City	Medium City
Loss Rate (%)	17.00	30.00	39.00
Disposal Rate (%)	71.84	60.43	52.68
Treatment Rate (%)	9.96	8.46	6.56
Reduction at Source Rate (%)	1.39	0.83	1.51

Fig. 6 SWM Performance in Indonesia

Note)
- Not all cities (total >400 cities in Indonesia) join ADIPURA
- Small cities (population <250k) has even lower collection rate than medium cities
- Comparison data from BPS (National Statistic Bureau), 2014
- National level of those indicators are; Loss Rate (34.5%), Disposal Rate (56.8%), Treatment Rate (7.38%), and Reduction Source Rate (1.37%) respectively.

(Source: SWI analysis based on ADIPURA Data of 104 cities and World Bank, 2016)

ADIPURA Programme

ADIPURA is a national programme of MoEF of Indonesia oriented towards achieving environmentally sound region and sustainable development. It conducts monitoring of local government performance in environmental management, and an award (the ADIPURA Award) is then given to the successful municipalities/ regencies. Solid waste and green open space management is one of the fields monitored under ADIPURA. Achievement is determined through:

- Area cleanliness
- Waste handled (waste collection coverage)
- Operation of final waste disposal site

Municipalities provided the data required in the programme, including solid waste management data, to assessors from MoEF. The data is published through the national solid waste information system (Sistem Informasi Pengelolaan Sampah Nasional), developed by MoEF and updated periodically. In terms of solid waste management, data collected includes: *solid waste collection, at-source solid waste treatment, TPS3R, waste banks, and informal waste collectors.*

Indonesia Municipal Waste Source and Composition

In 2018 the SIPSN (Sistem Informasi Pengelolaan Sampah Nasional; National Solid Waste Management Information System) from MoEF revealed Indonesia's municipal waste sources and composition. (Fig. 7 and Table 4). The major sources of waste generation are "Household" (42.51%) followed by "Traditional market" (23.17%). The composition of the "plastic" in municipal waste in Indonesia is shown to be 10.58%.

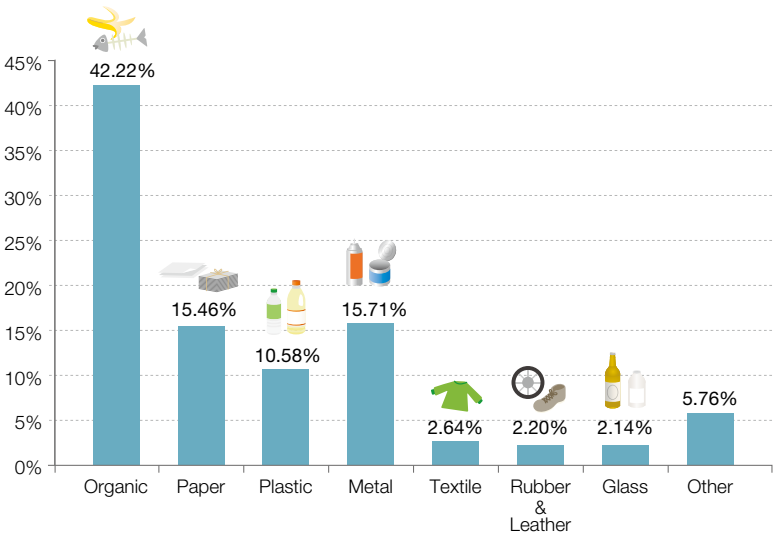


Fig. 7 Municipal waste composition in Indonesia (Source: SIPSN, 2018)

Table 4. Municipal Waste Source in Indonesia

Source of Waste	Proportion (%)
Household	42.51
Office	5.47
Traditional market	23.17
Commercial area	6.17
Public facilities	9.04
Other areas	8.09

(Source: SIPSN, 2018)

2-3. National Waste Management Stakeholders

There are many stakeholders in waste management. Fig. 8 shows the waste management stakeholders according to waste flows. After consumers dispose of waste, these are mainly collected by local authorities and transported to the landfill (disposal site) via 3R centres, waste banks, the informal sector, and recyclers. Other collection routes also exist, such as an informal collection and a voluntary collection schemes conducted by the FMCG sector. The numerical value highlighted in red in the figure is the proportion of a plastic material in the flow. Although the flow is only focused on Java Island, the waste recycling ecosystem in Indonesia is well established, particularly for some types of recyclables (i.e. PET, PP, and other high value recyclables). In addition, more than 380 landfills (covering at least 8,200 ha) are operating. Many cities are facing a landfill-space shortage, and new land for landfills are difficult to find due to necessary approval by the community. The recycling ecosystem for some packaging materials is already established. However, the national recycling rate is still low, as most low value recyclables are still dumped at landfills or are completely unmanaged.

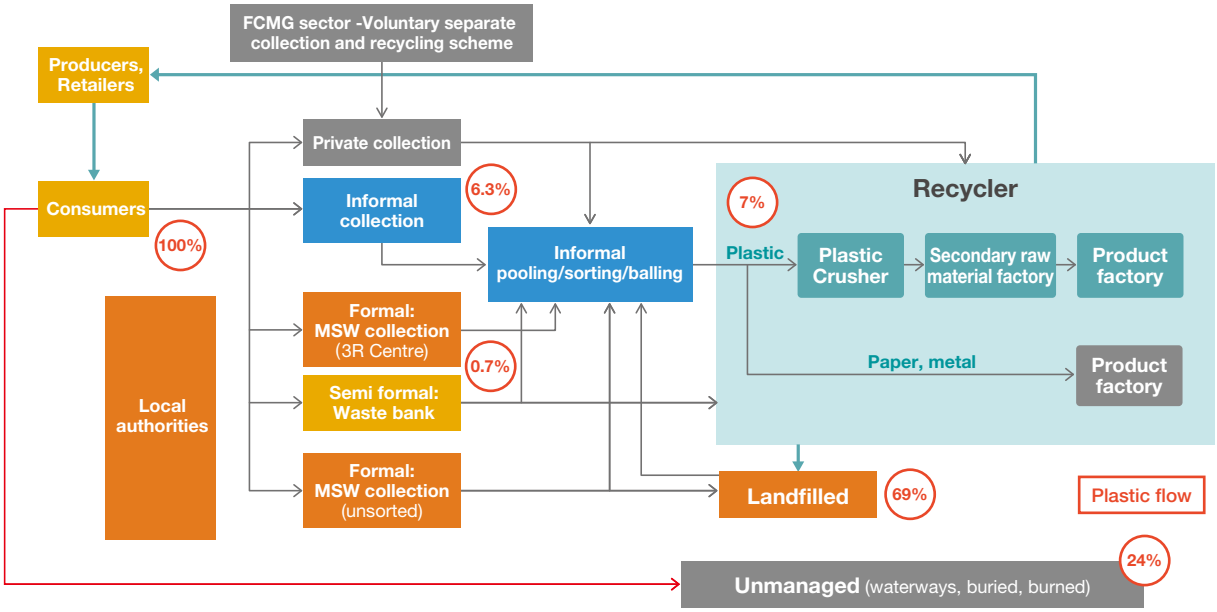


Fig. 8 Waste management stakeholder mapping in Indonesia (Source: SWI analysis for DANONE Infinity, 2018)

Table 5 shows the list of waste collection and recycling companies in Indonesia. Private companies are operating within specific areas. Companies listed in the table are operating under a business-to-business scheme.

Table 5. Waste and recyclable collector companies and associations

Waste collection private companies	Recyclables collector associations	Recycler associations
Companies with recyclables sales only	**Formal and semi-formal sector**	
PET bottles, aluminum can collection from waste pickers and vending machine in Bali. Ecojos also has plastic crushing factory with capacity: 540 tonne PET/month	Asosiasi Bank Sampah Indonesia (ASOBSI) is association of waste banks in Indonesia, recently formed with support of the MoEF. It is targeted that every province in Indonesia has members of ASOBSI	Asosiasi Daur Ulang Plastik Indonesia (ADUPI)
PET bottles collection from waste pickers and drop box at retailers in Bali. BaliPET also has plastic crushing factory with capacity: 500 tonne PET/month		Asosiasi Pengusaha Daur Ulang Plastik Indonesia (APDUPI)
Companies with tipping fee	**Informal sector**	
Household waste collection and treatment service in **Bekasi** (tipping fee based). Separated PET bottle and other plastic materials are sold to recyclers.	Ikatan Pemulung Indonesia (IPI) is association of waste pickers in Indonesia. The members are not only scavengers, but also poolers and recyclers. According to IPI, currently Indonesia has more than 2 million people working as scavengers.	
Non organic household waste collection service in **Bali** (tipping fee based). Separated PET bottle and other plastic materials are sold to recyclers. Capacity: 30 tonne non organic/month		
Household waste collection and sorting service based in **East java** (tipping fee based). Recyclables are utilised for their own recycling initiatives as well as for other offtake market. Capacity: 300 tonne per day from 6 currently operational MRF		

(Source: SWI analysis for DANONE Infinity, 2017–2019)

Waste Bank in Indonesia[7]

The waste bank is a community-based organisation whose establishment can be initiated by the government, NGOs, or private sector. The operation is driven by the community in economically viable and environmentally friendly manner. Waste bank as a business is owned by people who consider waste as a valuable economic commodity and savings, has

7 Source: 1) https://www.merdeka.com/uang/2017-5244-bank-sampah-raup-pendapatan-capai-rp-148-miliar.html, https://ekonomi.bisnis.com/read/20181203/99/865720/dorong-mekanisme-bank-sampah-klhk-gelar-rakornas, 2) Suryani, E. (2016): Manajemen bank sampah di Kota Bekasi, *Jurnal Administrasi dan Kebijakan Publik,* 6(1), 63 – 75. 3) Wijayanti, D.R. and Suryani, S. (2015): Waste bank as community-based environmental governance: a lesson learned from Surabaya, *Procedia Social and Behavioral Sciences,* 184, 171 – 179.

instruments that involving community in waste management.

Waste bank has a similar system of regular banks. People have an account at waste bank, and bring their household waste (usually non-organic) to the bank and the monetary value of those waste are determined based on the rates by secondary waste collectors. People can save the value in their account and withdraw when necessary. Many of waste banks are operated by female.

The first waste bank in Indonesia was established in Bantul, Yogyakarta in 2008. In 2017, the number of waste banks grew significantly, increasing from 5,244 to 7,488 (Fig. 9). Customers of waste banks also grew quite notably over the last five years. In 2018, the number reached more than 200,000 waste bank customers (Fig. 10). On 15 March 2017, the Waste Banks Association (ASOBSI) was established (http://www.asobsi.org). Waste bank managers also have routine coordination meetings every year.

The contribution to the waste reduction impact by a waste bank (amount of waste collected in waste banks) against all waste generation in Indonesia was 1.7% in 2017 and, 2.37% in 2018 (Fig. 11).

Mapping of the 10 most successful waste banks initiated by the Unilever Indonesia Foundation (part of PT Unilever Indonesia) is shown in Fig. 13 (refer to the "Tips-1"). Basically, the 10 waste banks managed to trigger behaviour changes in the community and promote community support for operation of the waste bank (via active participating in waste bank, by becoming waste bank customers). Therefore, the waste banks managed to sustain their operations and generate profits.

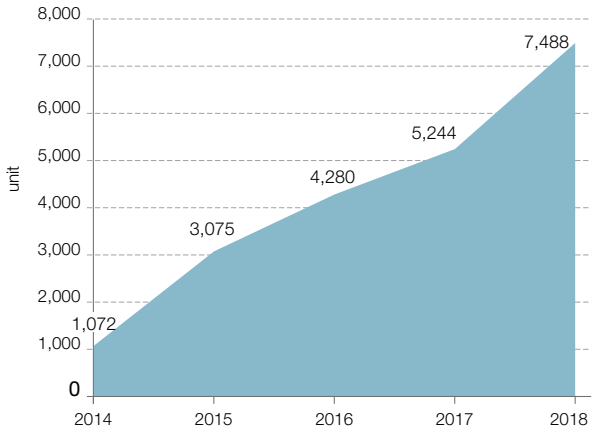


Fig. 9 Number of Waste Bank in Indonesia

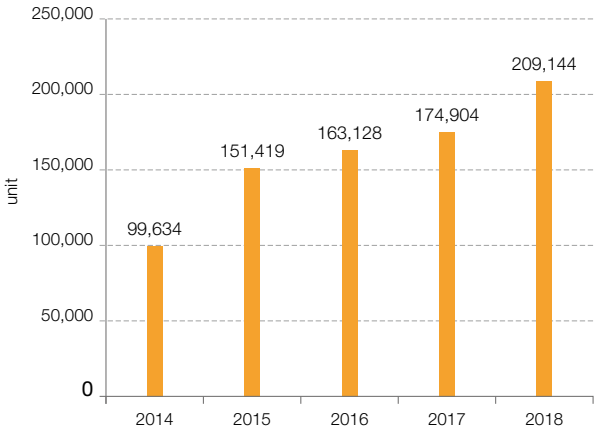


Fig. 10 Number of Waste Bank' Customers in Indonesia

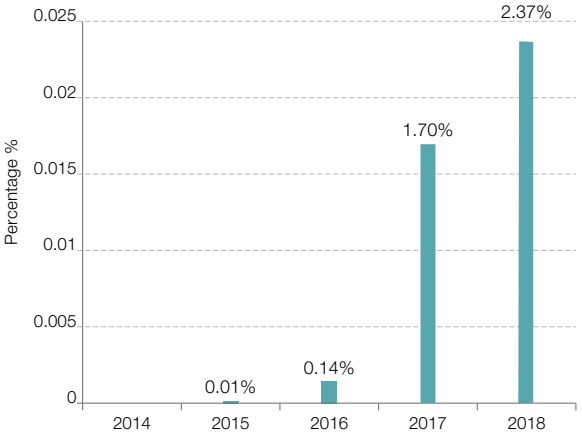


Fig. 11 Waste Bank contribution to national waste reduction

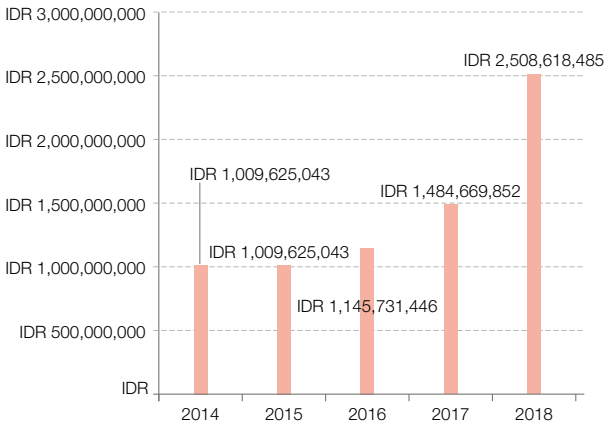


Fig. 12 Economic benefit of Waste Banks

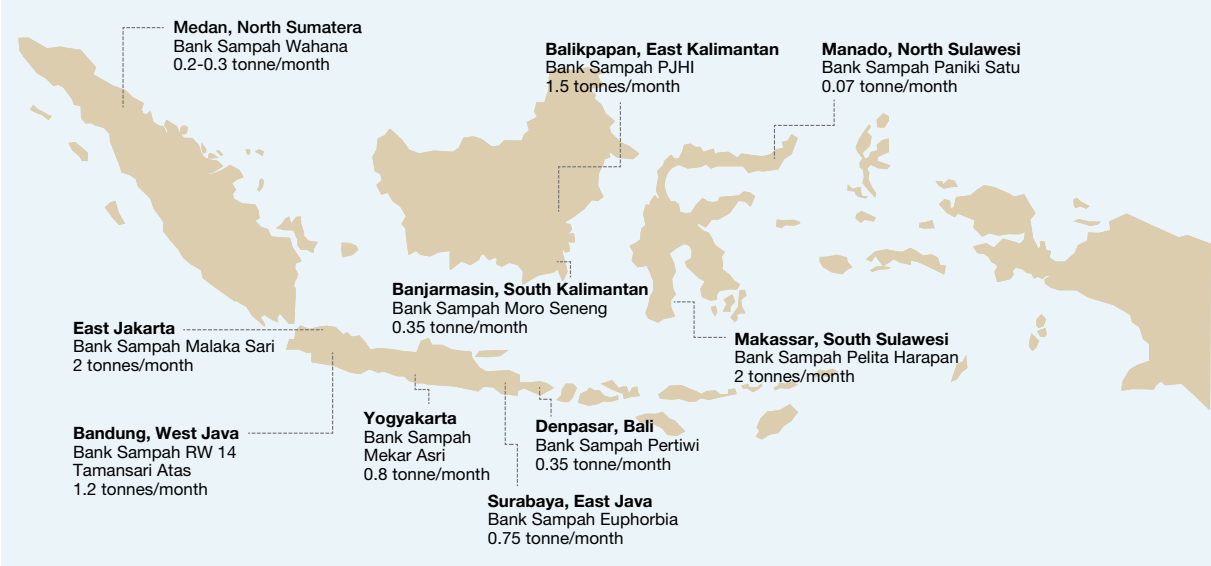


Fig. 13 10 most successful waste banks initiated by Unilever Indonesia Foundation

(Source: Unilever Waste Bank Guidebook, 2013)

Tips-1: Waste Bank in West Jakarta Hit Billions of Rupiah in Profit

One of the success stories of waste banks, with billions of rupiah in profits, is the Satu Hati Waste Bank in West Jakarta, established in April 2017. The Satu Hati Waste Bank gained at least Rp7.2 billion (US$511,736) in profits. "The profit is not our revenue but basically money that has been circling among the residents of West Jakarta. The Satu Hati Waste Bank can receive between Rp12–15 millions per week, in average. The success comes because in August 2017, we signed an MoU with Bank BNI and Danone, which is still going on," said Edy Mulyanto, head of West Jakarta Environmental Agency. Mulyanto said that Bank BNI manages the finance of 662 waste bank units in West Jakarta. "The money will go directly to customer's bank account," he added. "Our management system is a collaboration between people and government. The Satu Hati Waste Bank can be an example for other waste banks. We also manage to reduce non-organic waste at the Bantar Gebang Landfill by 3,780 tonnes," he said. The 2019 National Waste Care Day took on the theme of Manage Waste for Clean, Healthy and Valuable Life. Waste bank is expected to be the effort of saving the environment and transform waste into economically valuable for people.

(Source: https://www.greeners.co/english/waste-bank-in-west-jakarta-hit-billions-rupiah-of-profit/)

Waste Bank Challenges in Indonesia

Based on surveys and evaluations, such as those carried out through ADIPURA, and conducted in the past by MoEF and donors, a number of lessons learned about waste banks in Indonesia have been accumulated. While there is potential in strengthening of waste banks to contribute to achievement of national targets, waste banks are still facing the following challenges:

- Reduction of waste transported to the landfill has not been achieved. The amount of waste transported is still increasing despite an increase in the number of waste banks.
- Waste banks do not sell their recyclables directly to the recycling industry, but through *lapak* or *bandar* (the informal sectors, middleman) first. This causes their selling price to not be as high as expected.
- The recyclables in the waste banks are easy to accumulate because no industry has become a permanent off-taker. The recycling industry and waste banks should build a partnership.

- Waste banks are often built quickly, with great enthusiasm. As the trend of waste banks increases, many communities or stakeholders are building waste banks without well-prepared systems.

- Waste banks are generally successful among the lower-middle class communities because the incentives obtained are enough to help their local economy. Meanwhile, the upper-middle class is not ery interested in waste banks and more willing to pay for waste disposal and waste separation.

- The approach used to encourage communities to conduct waste separation and become customers of waste banks requires continuous effort and not just socialisation, but also focus group discussions. Changing the paradigm is not a simple task.

- Waste banks are not the only solution to reducing waste sent to landfills.

- There should be further development of waste banks' management. The government needs to make further regulations to protect managers and customers of waste banks. This can be formed as Standard Operating Procedures, an integrated programme between waste banks and co-ops (*koperasi*) or common banks. Consequently, the profit model can be optimally managed for the welfare of both managers and customers. A promotion or extensification programme by local people and the government is required. Thus, community-based environmental governance can be carefully developed in the future.

2-4. National Plastic Industry

Table 6 shows the outline of Indonesia's plastic consumption and production information. The plastic types are PP, PE, PS, PET and PVC. Average plastic consumption per Indonesian capita which includes virgin and recycled one is 22.5 kg/capita/year, which is much lower than Thailand, Malaysia and Singapore (> 60 kg/capita/year).

Table 6. Plastic consumption and production in Indonesia (PP, PE, PS, PET & PVC)

Item	Amount	Source
Production capacity	2,660,000 tonnes/year	INAPLAS/MOI
Production	2,310,000 tonnes/year	INAPLAS
Import	1,670,000 tonnes/year	BPS
Recycle	1,655,000 tonnes/year	ADUPI & APDUPI
Total National Demand	5,635,000 tonnes/year	

(Source: Directorate for Downstream Chemical and Pharmaceutical Industry, MoI (2019). *Policy of National Plastic Industry.* Presented at Seminar Peran Industri Daur Ulang Plastik Sebagai Upaya Pengurangan Sampah Plastik di Indonesia 7 February 2019, Jakarta, by IGES – KLHK – SWI)

Types of plastic industry and plastic applications

Fig. 14 and Fig. 15 show the proportion of the types of plastic manufacturing industries based

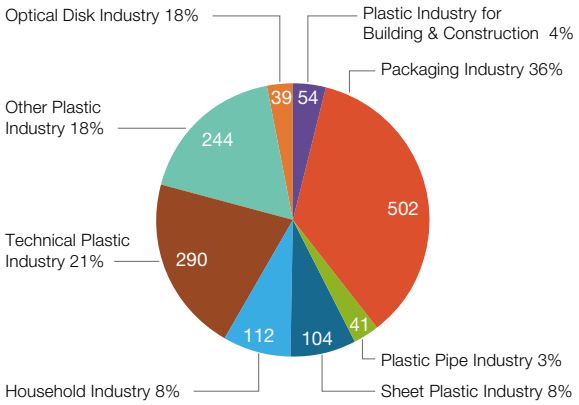


Fig. 14 Type of plastic manufacturing industry

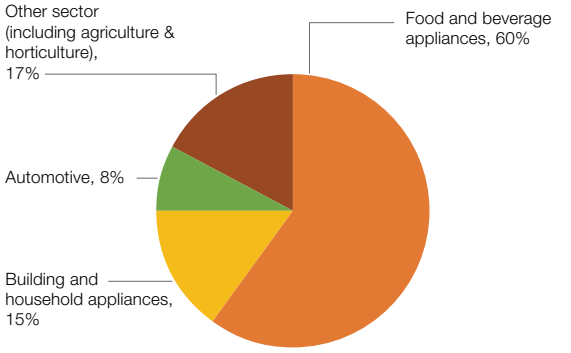


Fig. 15 Type of plastic appliance

(Source: Directorate for Downstream Chemical and Pharmaceutical Industry, MoI (2019). *Policy of National Plastic Industry*. Presented at Seminar Peran Industri Daur Ulang Plastik Sebagai Upaya Pengurangan Sampah Plastik di Indonesia 7 February 2019, Jakarta, by IGES – KLHK – SWI, and http://www.gbgindonesia.com/en/manufacturing/article/2016/indonesia_s_plastic_andamp_packaging_industry_still_dependent_on_raw_material_imports_11500.php)

on the standard field of business classification and plastic users, respectively, in Indonesia. The plastic packaging industry is the largest, with 502 companies (36%), followed by the technical plastic industry with 21% and the other plastic industry with 18% (Fig. 14). The food and beverage industry are the major plastic user in Indonesia, as 60% of plastics produced/imported are used within this sector (Fig. 15).

In addition, out of all the plastic products in Indonesia, PE, PP and PET account for 34%, 31% and 12% (totalling 77%) respectively, and the major user is the food and beverage packaging industry (Fig. 16).

Type of Plastic Packaging

A total of 61,608 products with plastic packaging are registered by the Indonesia National Agency of Drug and Food Control (BPOM). As shown in Fig. 17, more than 50% of plastic containers and packaging used for the goods and products in Indonesia are "plastic packaging". The plastic packages are usually disposed of by mixing with other wastes, and as a low value material they are difficult to separate and recycle.

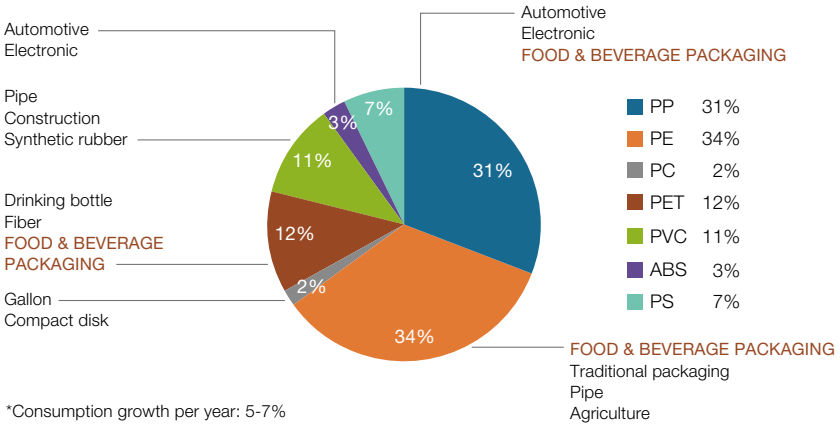


Fig. 16 Grouping industries based on plastic product

(Source. Directorate for Downstream Chemical and Pharmaceutical Industry, MoI (2019). *Policy of National Plastic Industry*. Presented at Seminar Peran Industri Daur Ulang Plastik Sebagai Upaya Pengurangan Sampah Plastik di Indonesia 7 February 2019, Jakarta, by IGES – KLHK – SWI)

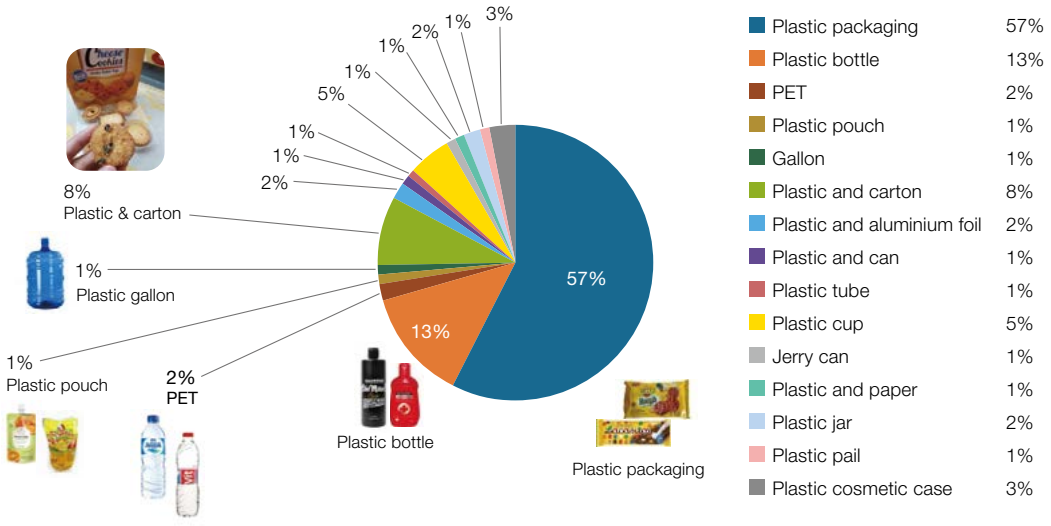


Fig. 17 Type of plastic containers and packaging consumed in Indonesia

(Source: BPOM, 2019. Retrieved from: cekbpom.pom.go.id)

Spread of country's plastic industries

Table 7 and Fig. 18 show the number of the plastic industry companies in Indonesia, and a map of their location. The majority of the companies are located on Java-Sumatera Island (the western part of Indonesia). The total number of companies is 1,580, with 1,367 (87%) on Java Island and 213 (13%) located elsewhere.

Table 7. Number of plastic enterprises

UNIT SCALE	ENTERPRISES	
	UNIT	%
Small Enterprises	193	12.20
Medium Enterprises	1.007	63.71
Large Enterprises	381	24.09
TOTAL	1.580	100.00

Fig. 18 Location of plastic industries

(Source: SWI analysis from MoI data, 2019)

Tips-2: Non-hazardous waste import policy

Ministry of Trade Regulation No. 31/2016 concerns provisions on the import of non-hazardous waste, especially plastic waste. It includes an import approval mechanism and verification due to increased national competitiveness, and to meet the industrial needs for using recycled raw materials that cannot be obtained within the country. A recommendation from MOEF and MOI is not required for import of "Metal scrap" and "Paper", which are categorised as "Group A", but it is required for import on "Plastic", "Rubber", "Yarn", and "Glass" in "Group B".

Non-hazardous waste that can be imported

Group A:
- Metal scrap
- Paper

➤ **Do not need recommendation**

Group B:
- **Plastic**
- Rubber
- Yarn
- Glass

➤ **Need recommendation from Ministry of Environment and Forestry and Ministry of Industry**

(Source: Ministry of Trade, 2019)

Plastic import and export trade balance in Indonesia

The graph (Fig. 19) shows the trade balance of plastic materials and products in Indonesia. The country is importing plastic goods to meet its internal demand, and there is a relative increase in the import of plastic goods each year (Data from the statistics agency showed imports of plastic waste rose 141% in 2018 from 2017, after a ban by China disrupted the annual global flow of millions of tonnes of waste).

Fig. 19 Plastic trade balance in Indonesia (in million USD)

(Source: Directorate for Downstream Chemical and Pharmaceutical Industry, MoI (2019). Policy of National Plastic Industry. Presented at Seminar Peran Industri Daur Ulang Plastik Sebagai Upaya Pengurangan Sampah Plastik di Indonesia 7 February 2019, Jakarta, by IGES – KLHK – SWI)

Regarding the import and export of plastic and plastic products (commodities), Indonesia is still importing plastic and plastic products to meet national demand, and they contribute to 6.2% of overall national imports of non-oil and gas commodities (Fig. 20).

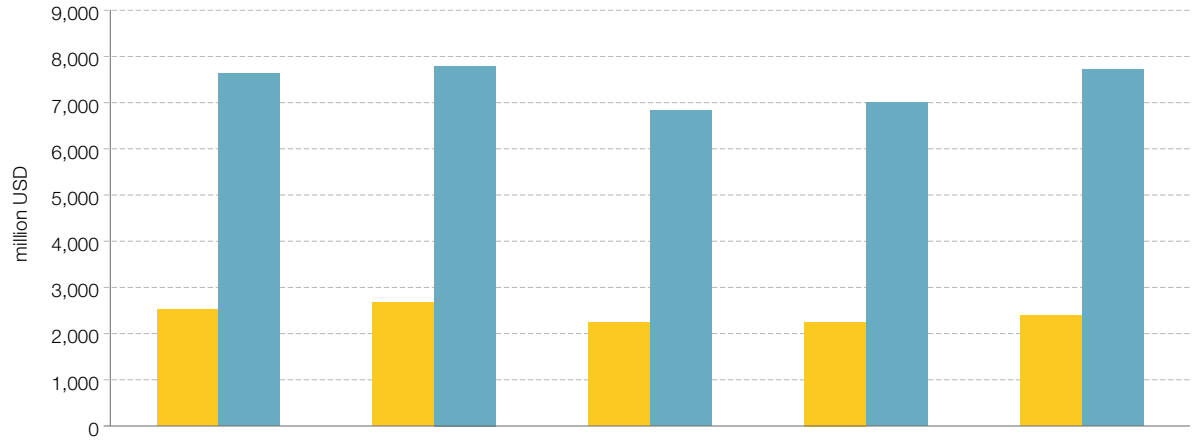


Fig. 20 Plastic and plastic products import and export

plastic = plastic raw material, plastic products = consumption products

(Source: http://statistik.kemendag.go.id/growth-of-non-oil-and-gas-export-commodity; and http://statistik.kemendag.go.id/growth-of-non-oil-and-gas-import-commodity)

Plastic Material Flows

The available and reliable data on plastic material and waste flows in Indonesia is very limited and data management and data accuracy is one of the challenges for waste management. Fig. 21 compares the data from the three different sources in the legend of the figure.

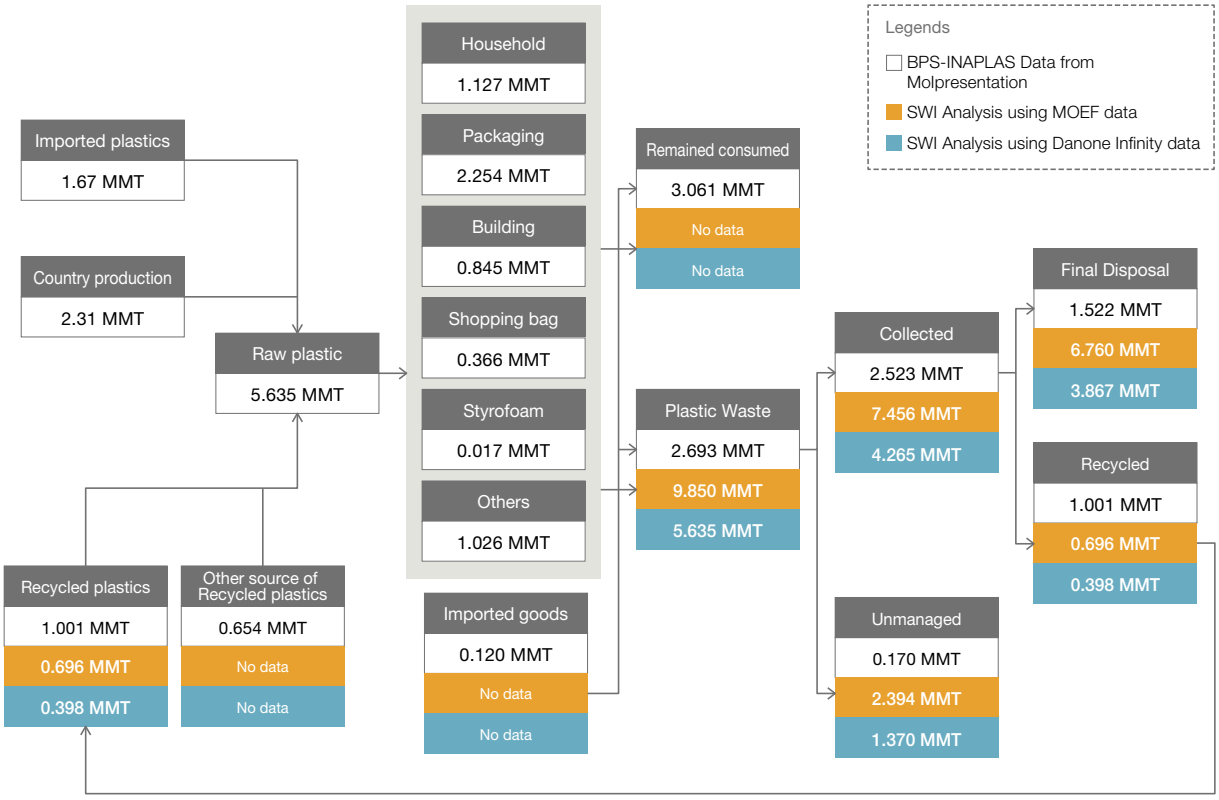


Fig. 21 Different figures on plastic material flows in Indonesia collected from various sources

In addition to the information above, the Government of the Republic of Indonesia announced in the National Coordination Team of Combating Marine Litter Meeting held in Coordinating Ministry for Maritime and Investment Affairs Office on 12 December 2019 that official national baseline data of marine debris emitted from Indonesia in 2018 is 0.27–0.59 million tonnes. The data is based on Indonesia Institute of Science (Lembaga Ilmu Pengetahuan Indonesia, LIPI) research in 2018. Then the Global Plastic Action Partnership, initiated by the World Economic Forum and implemented by SYSTEMIQ, revealed the information as follows[8] (Fig. 22):

- *In 2017, Indonesia generated 6.8 million tonnes of plastic waste. This is projected to increase to 13.6 million tonnes in 2040. (According to KLHK's data, the estimated plastic waste generation in 2017 was 9.2 million tonnes (Table 2 and Fig. 3), however, SYSTEMIQ's data shows the 6.8 million tonnes of waste generation in 2017.)*

- *Plastic represents 14–15% in terms of mass of all types of municipal solid waste. Flexible mono-materials are the most common type of plastic waste (45%), followed by multi-material plastics (29%), and rigid plastics (26%).*

- *Indonesians generate 0.50kg of solid waste/person/day, and this is projected to increase by 38% by the year 2040.*

- *Indonesians generate 0.07kg of plastic waste/person/day, and this is growing faster than the 66% rate of increase in overall waste generation*

8 GPAP – Business-as-Usual Scenario, Indonesia, 3rd Draft – For stakeholder consultation, 25 June 2019, SYSTEMIQ

rate by 2040. This will lead to a plastic making up 17.4% of the total waste composition by 2040.

- *The collection rate for plastic waste is 39% (31% by the formal sector and 8% by the informal sector).*
- *Of waste collected by the formal sector, 99% goes directly to landfills or dumpsites. TPS3Rs and waste banks make up the remaining 1%.*
- *Waste pickers at landfills ensure that 26% of plastics that arrive at landfills get recovered.*
- Together, the landfill and the non-landfill waste pickers supply 1 million tonnes of plastic waste to recyclers. Due to losses such as mismanagement and insufficient sorting, only two thirds of that amount is recycled. This puts the overall nationwide recycling rate of plastic at 10%.
- *In total, 53% of the waste collected through formal channels is disposed of in semi-engineered landfills, and 20% ends up in dumpsites. Treatment of the leachate or gas management is very rare, and large-scale incineration does not yet take place.*
- *Most uncollected waste (59%) is openly burned by households. Another 33% is dumped into the environment on land, while 8% goes directly into the water. Waste from dumpsites, dumping on land, and direct dumping into water accounts for the plastic leakage into lakes, rivers, and the ocean.*
- *Of the 650,000 tonnes of plastic waste estimated to have entered the lakes, rivers, and the ocean in 2017, ~50% was leaked in rural areas of Indonesia, and ~50% of it is composed of flexible monolayer materials.*
- *If Indonesia does not add additional capacity, leakage into bodies of water will more than double to 1.6 million tonnes of plastic in 2040, or 1.4 million tonnes if collection rates remain constant.*

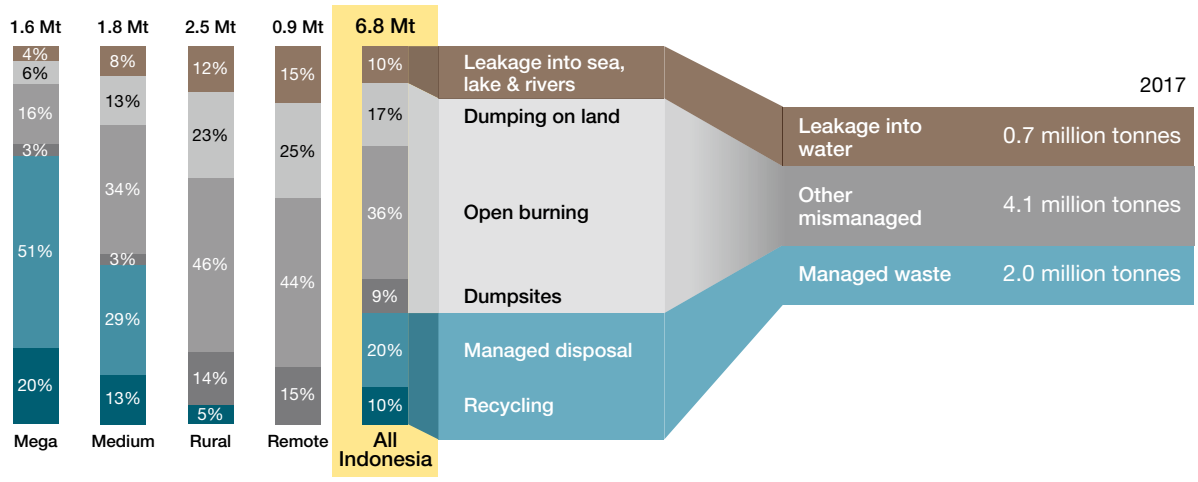


Fig. 22 SYSTEMIQ analysis on plastic waste flows

Potential Plastic Material Recycling

Based on both the plastic material and waste flows, Table 8 and Fig. 23 show the potential plastic material collection and recycling treatment flows.

Table 8. Recycling options both in general and the Indonesian context

Category	General Options	Options in Indonesian Context
1. Material recycling (Mechanical recycling)	Plastic raw materials -> Plastic products	Plastic raw materials (Pellets, PET flakes) -> Plastic products (Textiles, Sheets, Injection molding, bottles, etc.) • Asphalt-Plastic Roads
2. Chemical recycling (Feedstock recycling)	• Monomerisation • Blast furnace reducing agent • Coke oven chemical feedstock recycling (Hydrocarbon oil) • Chemical feedstock • Gasification (as a raw material in the chemical industry) • Liquefaction (plastic to oil)	Liquefaction (plastic to oil)
3. Thermal recycling (Energy Recovery)	• (Gasification, Liquefaction) • Cement kiln • Waste power generation • Refuse paper & plastic fuel	• Cement kiln • Waste power generation • Refuse paper & plastic fuel

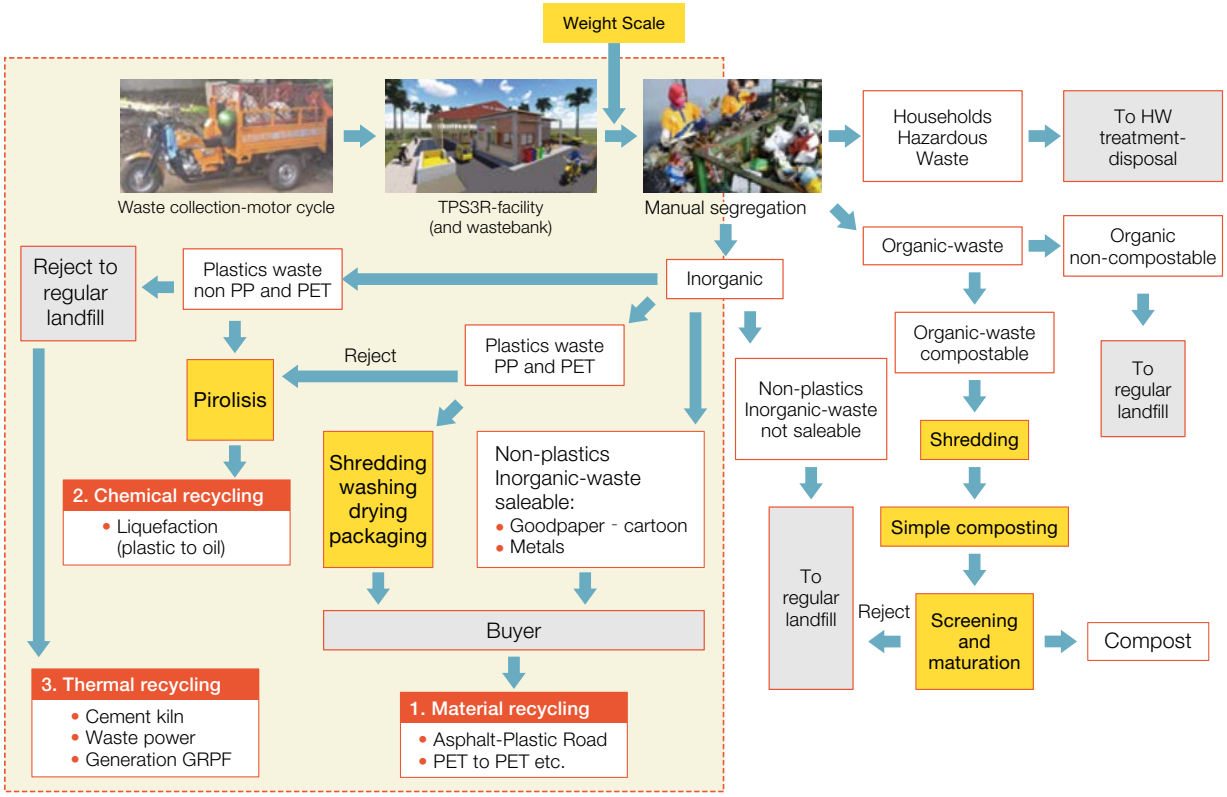
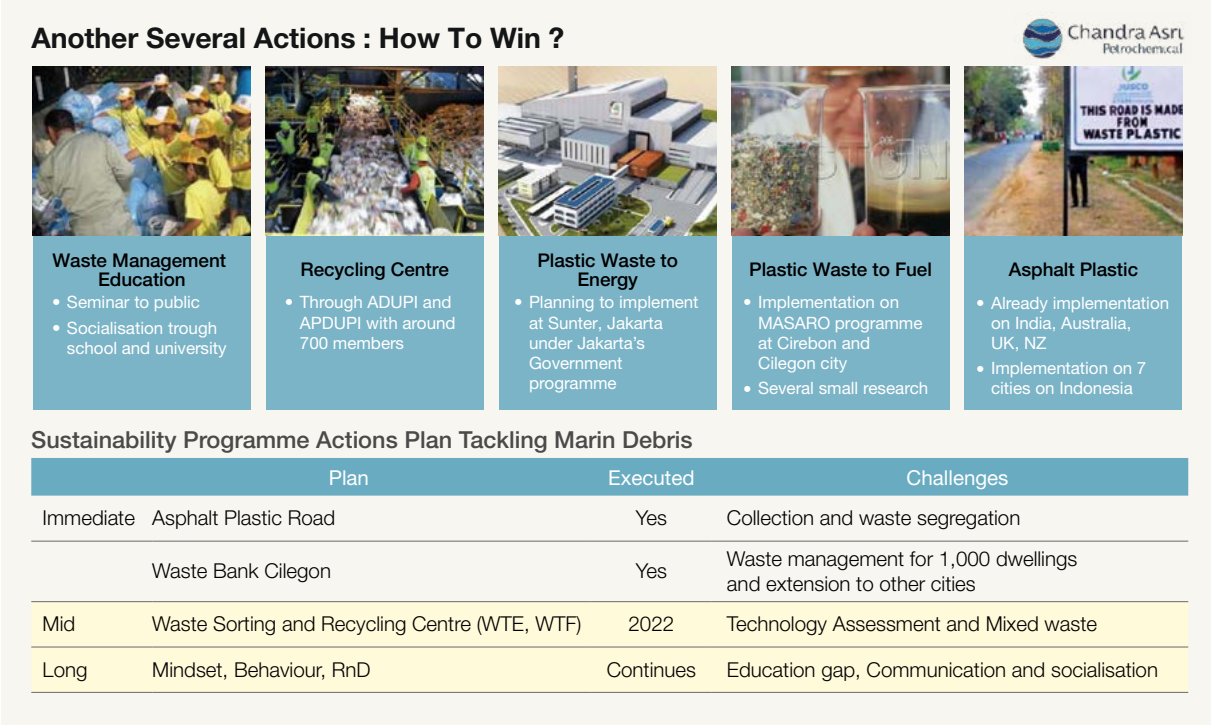


Fig. 23 Plastic collection and treatment flow
(Source: Originally from Prof. Dr. Ir. Enri Damanhuri, Department of Environmental Engineering, Faculty of Civil and Environmental Engineering, Institute of Technology Bandung, modified by Makoto Tsukiji)

The above recycling options should be selected according to the local context, including environmental impact (plastic pollution, input of new resources such as oil, GHG emissions, etc.), the least social cost, the waste management system (Fig. 23), and the demands and market for plastic materials. In Indonesia, the Ministry of Public Works and People's Housing (PUPR) has initiated research on asphalt plastic since 2004, and the use of reground shopping bags (HDPE) as an additive since 2017. The Indonesia Olefin, Aromatic and Plastic Industry Association (INAPLAS), and the Indonesia Partnership on Plastic Waste Management (IP2WM) are promoting plastic recycling, including asphalt-plastic roads, and converting plastic waste to fuel, in their own initiatives (Fig. 24).



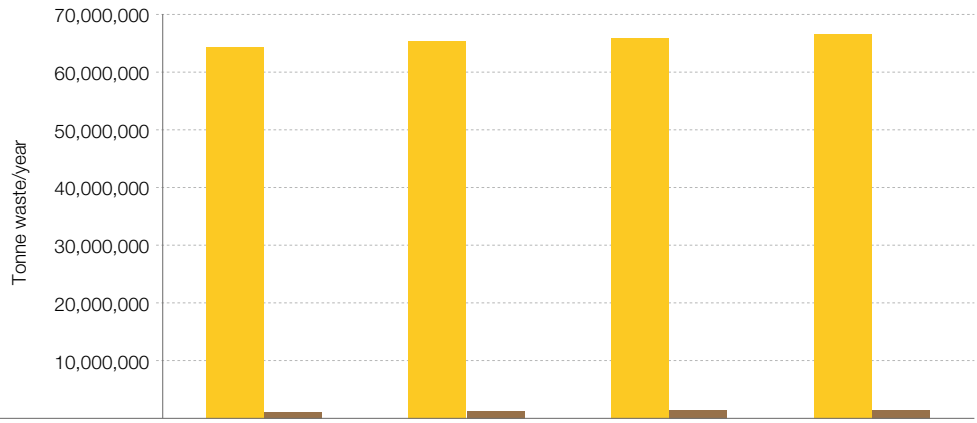
Sustainability Programme Actions Plan Tackling Marin Debris

	Plan	Executed	Challenges
Immediate	Asphalt Plastic Road	Yes	Collection and waste segregation
	Waste Bank Cilegon	Yes	Waste management for 1,000 dwellings and extension to other cities
Mid	Waste Sorting and Recycling Centre (WTE, WTF)	2022	Technology Assessment and Mixed waste
Long	Mindset, Behaviour, RnD	Continues	Education gap, Communication and socialisation

Fig. 24 INAPLAS and IP2WM activities on plastic waste management
(Source: Mr. Edi Rival, Chandra Asri, INAPLAS, Our Ocean Conference, Bali Indonesia 2018)

2-5. Priority Issues on Plastic Pollution in Indonesia

The waste reduction rate at source in Indonesia was 2.26% in 2018 (Fig. 25), while JAKSTRANAS has the target of 30%. This is measured by the waste collected at waste banks, EPR initiatives, and the estimated capacity of waste treatment facilities. The yellow and blown colors in the figure show the waste generation (tonnes/year) and estimated reduction (tonnes/year) respectively. Data is taken from JAKSTRANAS (Presidential Decree 97/2017) in the MOEF (Indonesia has a waste management data system called National Solid Waste Management Information System and also collects data from each municipality).



	2015	2016	2017	2018
Waste Generation (tonne/year)	64,400,000	65,200,000	65,800,000	66,500,000
Estimated Waste Reduction (tonne/year)	1,118,979	1,130,431	1,395,462	1,503,635
Waste reduction rate (%)	1.74	1.73	2.12	2.26

Fig. 25 Waste reduction rates among overall waste generation in Indonesia
(Source: Directorate for Waste Management, MoEF (2018). *Background Study of Waste Management for RPJMN.* Presented at Bappenas, December 5, 2019, Jakarta)

Gap analysis and priority issues

Table 9 outlines the targets, current situation and gaps, in accordance with collected data and information, as well as the resulting discussion in chapter 1–2 of this documents. Based on the table, chapter 3 shows the "Strategic Action for Plastic Waste Reduction in Indonesia".

Table 9. Summary of the Gap Anaylysis

Target	Current situation	Gaps
Waste reduction rate Target: 30% in 2025	Current: 2.26 % in 2018	> 27 % to be achieved in 7 years
Improved solid waste management infrastructure performance	Non-open dumping vs Open dumping waste disposal: 188 units vs 167 units	- Develop landfill capacity to cope with waste generation - Seek land availability for landfill
	Waste-to-energy installation is planned, but not yet implemented.	Challenge in investment and operation & maintenance cost for high-end technology
Upstream plastic waste reduction	- Regulation on EPR is under formulation, but not yet issued and implemented - Plastic waste import is strictly regulated - Plastic bans (Fig. 2) in some regions are facing resistance and even judicial review requests from plastic industries	Need to promote EPR implementation - producers redesign their packaging, including using recycled content in their packaging - proper take back collection system - promote sustainable alternatives for plastic packaging Promote awareness and education on the importance of reducing plastic waste - Need to create a massive and systematic public campaign
Downstream plastic waste reduction	- 7% recycling rate - Recycling industries are mainly on Java island - Connectivity and sustainability of the available system is still challenging	Assist the recycling industry - as close to the waste source as possible - ensure offtaker of recycling products - promote good business models that can ensure connectivity and sustainability of system
	Lack of public participation in waste segregation, resulting in a low success rate of the community-based system	Promote behaviour change communication, information and education on household waste management
Improved data and information system	Global partnership on plastic in Indonesia to initiate data and information management on plastic waste	- Need to strengthen data collection on plastic waste - Need technology to tackle plastic leakage to the environment problem
Others	- Lack of coordination among line ministries as well as synergies with other strategies and plans such as JAKSTRANAS - Lack of assistance for local government	- Promote coordination among line ministries and institutions - Generate synergies with other plans or action strategies, including JAKSTRANAS - Promote involvement for locally applicable resources - Need a policy governing cooperation between the private sector and the local government in waste management

3 Strategic Action Plan for Plastic Waste Reduction in Indonesia

Chapter 3 shows the strategic action plan for plastic waste reduction to tackle marine plastic pollution in Indonesia. Fig. 26 shows the framework of strategic actions and policy interventions with the highest potential to reduce plastic pollution over the short-, medium- and long-term. Based on the framework, the Strategic Action Plan for Plastic Waste Reduction in Indonesia covers plastic litter in the marine ecosystem, and plastic waste management and plastic consumption which is targeted in the short- and medium-term. This is the reason why the target year is set as 2025, with 5-Year Strategic Action Plan focused on 2020 to 2025.

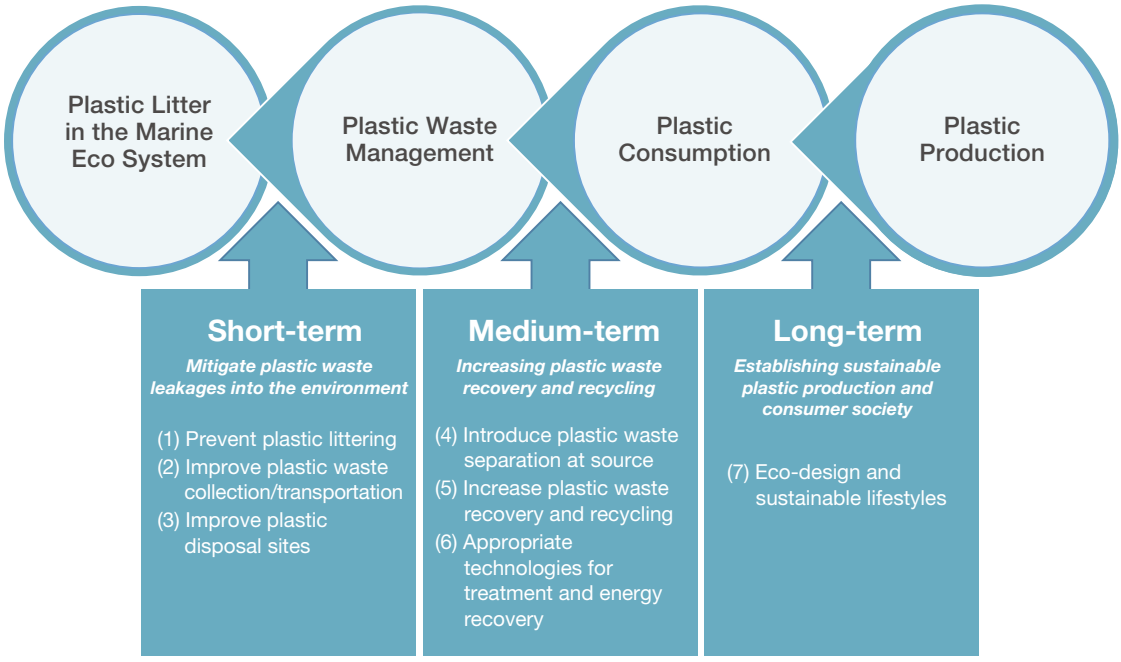


Fig. 26 Strategic actions from a short to long-term perspective

(Source: Reducing Marine Plastic Pollution in Low- and Middle-income Countries Adopting Land-based Plastic Waste Management Strategies and Policy Interventions, IGES and UNEP, 2020)

3-1. Guiding Principles, Strategic Goals, and Target Indicators

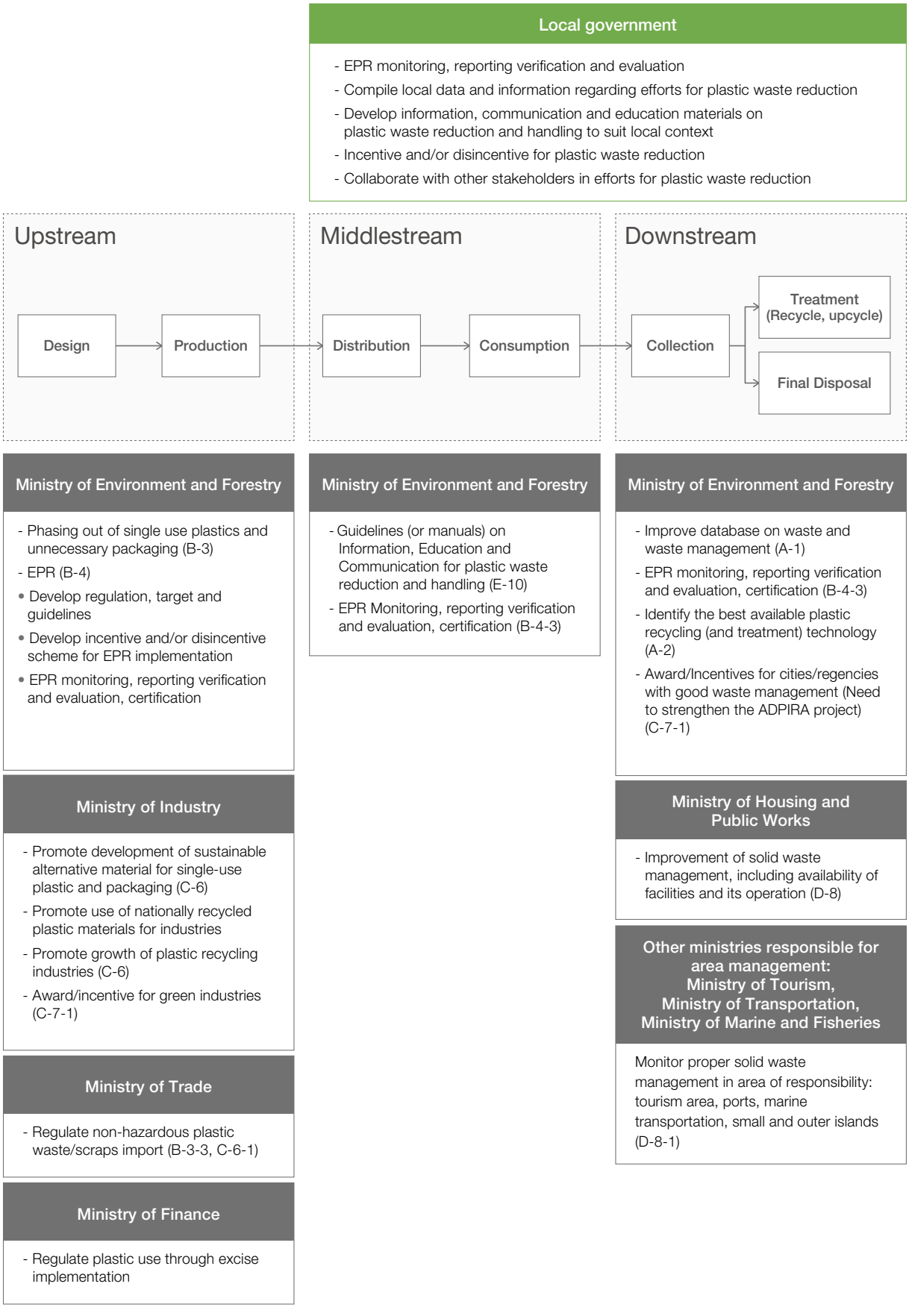
Guiding Principles

- **Align with Indonesian context**
  Industry, Business, Waste Management System, Community Activity
- **Apply for the best plastic recycling technology**
  domestic plastic sorting, collection, recycling, and treatment system
- **Promote sustainable import, production, and consumption of plastic**
  Material and plastic items life cycle approach, economic impact, consumer behaviour
- **Enhance involvement, responsibility, and initiatives from the private sector and society**
  EPR, CSR, Levy, no littering, 3Rs

Table 10. Recycling options both in general and the Indonesian context

Strategic Goals	Target Indicator	
	Baseline (2017)	2025
1. Reducing plastic waste generation, with plastic waste reduction	Amount of Plastic Waste Reduction	
	2.26%	30%
2. Reinforcing the plastic recycling system, with plastic waste reduction	Amount of plastic wastes recycled	
	0.696M (Mt/year) 7%	Not officially decided yet
3. Reducing marine debris emitted into the ocean	Amount of mismanaged plastic waste	
	0.27–0.59 million tonnes (2018)	70% Reduction
4. Consolidating stakeholders' responsibility, with the amount of EPR programme	Number of EPR programme implemented	
	N.A	Not officially decided yet

3-2. Framework on Actions for National and Local Government



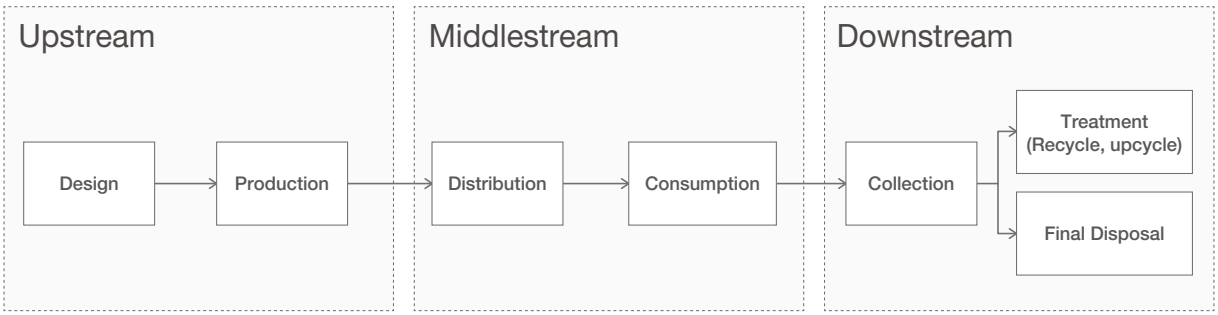
3-3. Framework on Stakeholder Involvement (Non-government Sector)

NGOs, Civil Society and Research Institute

- Coordinate stakeholders (government and private sector) to promote information, communication and education on plastic waste reduction and handling (A-1-1)
- Strengthen data collections and development of robust database in waste management (A-1-2)
- Conduct studies and programmes for plastic waste reduction (A-1-3)

Consumer

Participate in waste segregation, plastic waste return (take-back scheme) and wise use/buying of plastic product



Manufacturing and FMCG companies

EPR:

- Product redesigning by using recyclable materials and/or materials which generates less plastic waste
- Initiatives to reduce plastic waste/recycled plastic materials import (B-3)
- Identification and reporting on plastic product sand its potential environmental impacts (B-4)
- Monitoring, evaluation and reporting
- Developing technology and innovation for creating sustainable alternative material for plastic packaging (such as bio-based material)

Manufacturing and FMCG companies

EPR:

- Collaborate with retailers (private and/or traditional market) on take-back scheme (C-6)
- Inform, communicate and educate consumer on take-back scheme to reduce plastic waste (C-6)
- Monitoring, evaluation and reporting (C-6)

Retailers

EPR:

- Collaborate with retailers (private and/or traditional market) on take-back scheme (C-6)
- Inform, communicate and educate consumer on take-back scheme to reduce plastic waste (C-6)
- Monitoring, evaluation and reporting (C-6)

Manufacturing and FMCG companies

EPR:

- Collaboration with existing plastic waste collectors/pooler, such as waste banks, TPS3R for recyclables utilisation (D-8)
- Monitoring, evaluation and reporting

Recycling sector
(Informal and semi formal collection, recyclers)

- Operates collection, segregation, processing, packing and transporting recyclables material through informal sector and/or community-based institution (i.e. waste banks) (D-8)
- Operates plastic recycling in collaborate with manufacturing, FMCG companies and retailers through EPR (D-8)

3-4. 5-Year Action Plan for Plastic Waste Reduction in Indonesia (2020 – 2025)

Strategy Action	Central and local government	Private sector	The public	Year 20**					
				20	21	22	23	24	25
A. Data Management and Feasibility Study									
1. Improving waste management database through JAKSTRANAS and ADIPURA	1-1. Reviewing JAKSTRANAS and ADIPURA and the data acquisition system 1-2. Improving JAKSTRANAS and ADIPURA data acquisition system 1-3. Conducting surveys and compiling plastic material flow based on item (7 items*) 1-4. Identifying the source, leakage, and hotspot of plastic pollution and developing a methodology for observation and assessment (related to 1-1)	1-1. Reporting the current amount of products and convey single-use plastic (SUP) goods, import, production, and consumption reduction plans to MoEF (and/or the local government) based on regulations (related to B-3-3)	(NGO) 1-1. Coordinating stakeholders (government and private sector) in order to promote information, communication, and education on plastic waste reduction and handling 1-2. Improving data acquisition and developing waste management database 1-3. Conducting studies and plastic waste reduction programmes						
2. Identification of the best plastic recycling (and treatment) technology	2-1. Supporting the private sector to conduct a feasibility study on plastic recycling 2-2. Developing an incentive for the private sector to promote plastic waste collection, recycling, and treatment 2-3. Finding support from donors and investors to promote plastic recycling and treatment through collaboration with local businesses in Indonesia 2-4. Developing a data management system with recyclers' associations to gather data and supervise the plastic recycling industry	2-1. Promoting and participating in investment and plastic recycling business/activity through collaboration with manufacturers, FMCG companies and retail through EPR (related to D-8-4) 2-2. Collaboration with the local government to gather data and supervise the plastic recycling industry							
B. Policy Steps and Options									
3. Banning the use and sale of certain single-use plastic goods (target: 7 items*)	3-1. Promoting "*My Bag Campaign (MBC)*" 3-2. Forming a guideline to promote prohibition on SUP*-based items 3-3. Regulating imports of non-dangerous plastic waste	3-1. Promoting MBC at retail companies and hotels 3-2. Forming an "Action Plan" to reduce SUP goods and importers, manufacturers, food and beverage companies, and retailers, along with conveying it to the MoE&F (and/or the local government) (related to A-1-1)	3-1. Encouraging female groups and communities to promote "MBC" from environmental aspect						

Strategy Action	Central and local government	Private sector	The public	Year 20**					
				20	21	22	23	24	25
4. Developing a policy option which mandates importers, factories, food and beverage companies to bear some responsibility in recovering packaging waste	4-1. Forming regulations, targets, and guides for EPR 4-2. Developing an incentive and/or disincentive scheme for EPR implementation 4-3. Supervision, report, verification and evaluation, certification for EPR		4-1. Implementation of recovery scheme in order to reduce plastic waste						
C. Stakeholder Involvement									
5. Creating a team to handle plastic pollution (government, private parties, academia, NGOs, communities etc.)	5-1. Promotion to form a national committee including the local government and stakeholder to discuss marine plastic pollution 5-2. Promotion to build partnerships among all stakeholders including the private sector and associations including the tourism sector		5-1. Participating in stakeholder meetings to provide the latest status, hotspots, experience and knowledge related to plastic pollution handling						
6. PPP promotion including strategy and voluntary reduction agreement	6-1. Forming an agreement between MoE&F (and/or the local government) and importers, manufacturers, food and beverage companies, and retail companies to voluntarily promote 'EPR including deposit recovery scheme and involvement in the gathering, recycling, and treatment of plastic waste 6-2. Forming a 'Voluntary Agreement' between the MoE&F (and/or the local government) and retail companies to voluntarily ban single-use bags (SUP) with routine reports to the MoE&F (and/or the local government)	6-1. Implementation of plastic waste recovery scheme 6-2. Consumer information, communication, and education concerning the recovery scheme to reduce plastic waste 6-3. Deliver routine reports concerning the recovery scheme to the MoE&F (and/or the local government)							
7. Reinforcing supervision and outreach	7-1. Improving ADIPURA (award/incentive etc.) for regencies/cities and private sectors which have committed plastic waste management well 7-2. Gathering information of local government and public activities, and develop a platform to share information related to marine plastic pollution in Indonesia (related to A-1-1)	7-1. Sharing good practices done by the private sector							

Strategy Action	Central and local government	Private sector	The public	Year 20**					
				20	21	22	23	24	25
D. Improvement of Solid Waste Management (SWM) System									
8. Improvement of SWM including the availability of facilities and their operations	8-1. Supervising proper solid waste management in areas of responsibility (tourism, ports, water transportation, small and outermost islands) 8-2. Sharing case studies of waste management activities through the JAKSTRANAS/ADIPURA 8-3. Providing training opportunities for waste management providers and community figures 8-4. Supporting training programmes carried out by the central and local government for the public 8-5. Strengthen informal sector involvement for recycling including taking care of their working environment, 8-6. Formalisation of the informal sector, 8-7. Other options to promote recycling such as EPR, separation at source to be recycled in other ways 8-8. Develop suitable recycling options in line with local context	8-1. Supporting training programmes carried out by the central and local government for the public 8-2. Assisting the informal sector of existing plastic waste collectors, such as waste banks, TPS-3R (intermediate treatment facility), and waste pickers for recycling purposes 8-3. Reinforcing the operation of collecting, sorting, processing, packing, and transporting of recyclable materials through the informal sector and/or community-based organisations (e.g. waste bank) 8-4. Operating plastic recycling through collaboration with manufacturers, FMCG companies, and retail through EPR	8-1. Improving community inspections to stop illegal dumping and identifying hotspots 8-2. Participating in waste sorting, plastic waste returning (recovery scheme) and tactful usage/purchase of plastic products						
9. Seeking alternative funding to improve waste management by local governments	9-1. Developing activities and plastic waste management pilot programmes in the local government 9-2. Improve the operation of collection, sorting, processing, packing, and transporting of recyclable materials through the informal sector and/or community-based organisations (e.g.: trash banks) 9-3. Reviewing and improving operations and landfill maintenance (related to A-1-4)								

Strategy Action	Central and local government	Private sector	The public	Year 20**					
				20	21	22	23	24	25
E. Awareness Raising and Hygiene Campaign									
10. Promoting awareness for waste management and 3R in schools and communities	10-1. Developing information, education, and communication guides on plastic waste reduction and handling 10-2. Integrating plastic waste management curriculum into the education system 10-3. Providing training opportunities to local governments and young people on waste auditing 10-4. Using social media to disseminate information	10-1. Leading and/ or supporting the local government to promote increasing environment awareness on plastic pollution campaign in schools and communities, whether technically or financially	10-1. Increasing awareness in communities through churches, the involvement of youth and female groups, and schools 10-2. Holding a community-based hygiene campaign to handle plastic pollution						
11. Promoting awareness-increasing activities for cleanliness and ocean waste	11-1. Supporting local government and community activities in increasing awareness and hygiene campaign 11-2. Promoting “reward programmes” such as ADIPURA to champions to local governments, private sectors, and communities which have done a significant effort in resolving plastic pollution in the ocean	11-1. Supporting ‘reward programmes’ such as ADIPURA which will be held by the MoE&F	11-1. Promoting awareness-increasing activities through public events such as sport events						
F. Playing A Role in International Agreements and Cooperation with Donors and International Organisations									
12. Seeking alternative sources of funding to handle plastic waste pollution in the ocean	12-1. Developing the required regulations based on the BC COP-14 amendment concerning plastic waste management 12-2. Supervising plastic waste reduction planning activities and compose biannual review reports required by G20 countries								

* 7 items: 1) Plastic beverage bottles, 2) Plastic bottle caps, 3) Food wrappers, 4) Plastic shopping bags, 5) Plastic lids, 6) Straws and stirrers, 7) Foam take-away containers

4 Monitoring, Evaluation and Review

4-1. Management of Project Cycle, Data and Finance - Ensuring Implementation and Service Quality

Securing adequate financial resources, development/adaptation/dissemination of appropriate technologies, forging partnerships with and building capacity of the relevant stakeholders, as well as developing a sound system for data monitoring and accountability frameworks are all important in order to ensure the implementation and the service quality of the strategy and action plan.

4-2. Managing Progress Based on PDCA Cycle

The Action Plan for Plastic Waste Reduction in Indonesia, as well as the project activities in general, will be implemented, monitored, evaluated, reviewed and updated via the PDCA (Plan-Do-Check-Action) cycle outlined below:

Stage 1: Plan – Preparation and drafting of the strategy

- Conduct baseline study and utilise the updated management and scientific knowledge as a basis for discussion on strategy development.
- Understand the situation and challenges, and conduct gap analysis.
- Set scope, vision, mission, and goals of the strategy.
- Identify and take into account stakeholder concerns and management challenges through consultations with relevant parties.
- Choose policy options on waste prevention and recycling, and draft action plans.
- Ensure inter-departmental coordination and forge political agreements for strategy development.

Stage 2: Do – Implementation and monitoring of the strategy

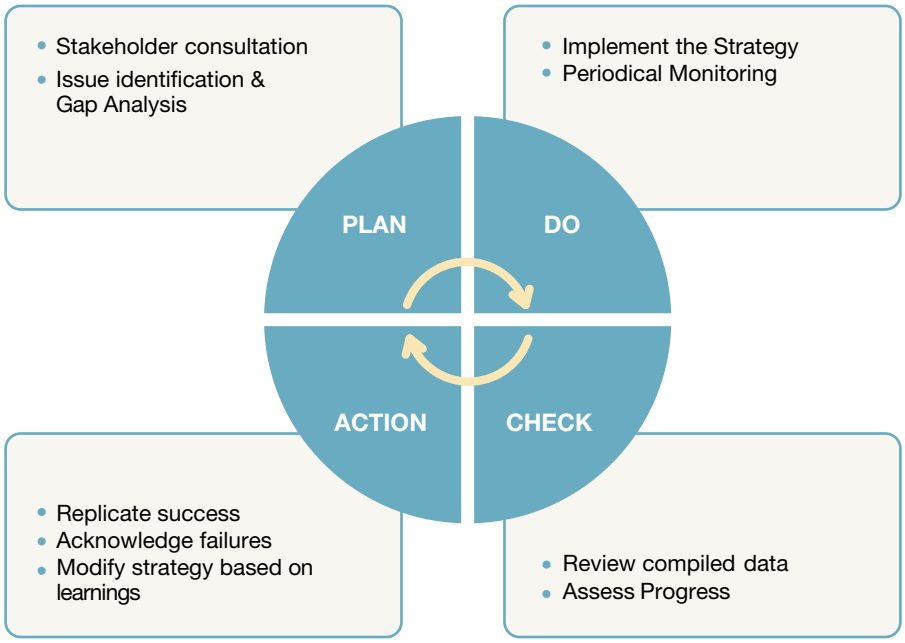
- Formalise strategy through appropriate administrative procedures.
- Disseminate strategy through various public outreach activities.
- Mobilise resources (financial, human, and political) and deepen collaboration with relevant partners towards implementing the action plans.
- Undertake regular monitoring to acknowledge progress and keep records of progress and/or key performance indicators for evaluations in the future.

Stage 3: Check – Evaluation and review of the strategy

- Analyse and assess the progress/project results against goals and targets.
- Review progress with relevant stakeholders and submit results to the independent evaluation committee.
- Identify and analyse areas of success and failure, and determine the contributory factors.

Stage 4: Action – Updating the strategy based on the evaluation

- Expand successful cases.
- Re-assess the evolving operating environment, and modify/reset the strategy to address emerging challenges.



4-3. Strengthen Data Generation for Better Decision-making and Project Management

In order to promote evidence-based policy making in the management of plastic waste, and to control the quality of service delivery, the following activities will be required:

- Identify hotspots of plastic leakage such as 1. Plastic value chain hotspots, 2. Plastic application hotspots, and 3. Plastic regional hotspots,
- Keep accurate records of incoming waste at landfill sites, primarily of the waste amount, and gradually expand to record further items, including waste type, sources, and/or area of generation/collection,
- Utilise collected data for planning, implementation, monitoring and evaluation of the strategy, as well as relevant decision-making,
- Utilise external capacity development opportunities to develop the data management skills of the responsible staff members, and
- Develop a support network through partnership with NGOs, private sector entities, and research institutes, to request their cooperation in data collection.

Useful Resources:

- Data Collection Tool for Municipal Solid Waste management (CCAC MSW Initiative by World Bank) https://www.waste.ccacoalition.org/document/data-collection-tool-full-version
- 3R Policy Indicators Factsheets Series (IGES) https://pub.iges.or.jp/pub/by/tags/3r-policy-indicators-factsheets-series

4-4. Securing Financial and Human Resources for Sustainable Service Delivery

In order to meet the public service needs of citizens, the following activities will be required:

- Promote efforts to identify and generate financial resources to sustain plastic waste management governance,
- Seek opportunities for public-private partnerships, to attain effective service delivery with economic efficiency where feasible,
- Deepen collaboration with external institutions (national institutions, development partners, private sector entities) to attract development finance and projects, and
- Recruit appropriate staff in order to ensure quality public service.
- Conduct capacity development activities and/or utilise external opportunities when available to strengthen the planning and operational capacity necessary to conduct waste management administrations. Areas of capacity development may include; data management, information and public relations management, waste management and recycling technologies, economic analysis, waste and resource management policy development, and public management.

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KEMENTERIAN
LINGKUNGAN HIDUP DAN KEHUTANAN

Ministry of Environment and Forestry
Republic of Indonesia
Director General for Solid Waste,
Hazardous Waste, and Hazardous
Substance Management

Manggala Wanabakti Blok IV Lantai 5
Jalan Jenderal Gatot Soebroto Jakarta 10270,
Republic of Indonesia
Phone/Fax: +62 21 85905637

UN environment programme

United Nations Avenue, Gigiri
PO Box 30552, 00100
Nairobi, Kenya
Tel: +254 (0)20 762 1234
Email: unenvironment-info@un.org
www.unep.org

Economy Division
International Environmental Technology Centre
2-110 Ryokuchi koen, Tsurumi-ku, Osaka 538-0036,
Japan
Tel: +81 6 6915 4581
Email: ietc@un.org
www.unep.org/ietc

IETC
Technology for Environment

IGES
Institute for Global Environmental Strategies

IGES Centre Collaborating with UNEP
on Environmental Technologies (CCET)
2108-11 Kamiyamaguchi, Hayama,
Kanagawa 240-0115,
Japan
Tel: +81-46-855-3840
www.ccet.jp