GUIDANCE ON THE DEVELOPMENT OF A ROADMAP

FOR MANAGING PLASTIC WASTE AND REDUCING NON-RECYCLABLE SINGLE-USE PLASTICS IN THE PHILIPPINES

WORLD BANK GROUP

DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES · NATIONAL CAPITAL REGION

Guidance on the Development of a Roadmap for Managing Plastic Waste and Reduction of Non-Recyclable Single-use Plastics in the Philippines

Citation:

World Bank. 2024. “Guidance on the Development of a Roadmap for Managing Plastic Waste and Reduction of Non-Recyclable Single-use Plastics in the Philippines.” Washington, DC: World Bank.

Cover photos: (top) iStock/laughingmango; (bottom) Shutterstock/Gigira. Further permission required for reuse.

GUIDANCE ON THE DEVELOPMENT OF A ROADMAP

FOR MANAGING PLASTIC WASTE AND REDUCTION OF NON-RECYCLABLE SINGLE-USE PLASTICS IN THE PHILIPPINES

CONTENTS

EXECUTIVE SUMMARY XIII

1. INTRODUCTION 1
1.1 The Plastic Waste Problem in the Philippines 1
1.2 Methodology and Approach 2
1.3 Structure of the Report 3

2. BACKGROUND: PLASTIC AND WASTE MANAGEMENT – PHILIPPINES 5
2.1 Solid and Plastic Waste Generation and Collection 5
2.2 Municipal Solid Waste Segregation, Collection, Treatment, and Disposal 7
2.3 The Informal Waste Sector 8
2.4 Financing Waste Management 9
2.5 Plastic Resins, SUPs, and Alternatives 10

3. CURRENT SECTOR STRATEGY – PLASTIC AND SOLID WASTE MANAGEMENT 13
3.1 Institutional Arrangements and Responsibilities 13
3.2 Forthcoming Regulations on Plastic Waste 15
3.3 Strategies for Plastic and Waste Management 16

4. BARRIERS IN PLASTIC WASTE MANAGEMENT 19
4.1 Policy and Institutional Barriers 19
4.2 Analytical and Infrastructure Barriers 23
4.3 Financial and Funding Barriers 23
4.4 Data and Information Barriers 25

5. THE PHILIPPINE PLASTIC WASTE MANAGEMENT ROADMAP 27
5.1 Roadmap – Rationale 27
5.2 Roadmap – Goal and Outcomes 29
5.3 Roadmap – Actions 32
5.4 Roadmap – Proposed Institutional Set-up 45
5.5 Roadmap – Key Stakeholders' Engagement 48
5.6 Roadmap – Funding Sources 52
5.7 Roadmap Implementation: Monitoring, Evaluation, Reporting, and Verification 54
5.8 Strategic Alignment with On-going Efforts to Improve Plastic Waste Management 56

6. CONCLUSION 59

BIBLIOGRAPHY 60

ANNEXES 65
Annex A: Key Plastic Resins and Single-use Plastics in the Philippines 65
Annex B: Actions and Timelines for the Plastic Waste Management Roadmap 68
Annex C: Proposed Institutional Set-up: Philippine Plastic Waste Management Roadmap 71
Annex D: Stakeholder Consultations Conducted in Preparing the SUP Roadmap 74
Annex E: External Evaluations of the Roadmap's Implementation 75

LIST OF FIGURES

Figure E.1. The Philippine Plastic Waste Management Roadmap and its outcomes xv
Figure 2.1. Percentages for the main sources of waste in the Philippines 5
Figure 2.2.Top 10 most common plastic items within, and on the banks of the Pasig River 6
Figure 2.3. Percentages for the top 10 plastic items within, and on the banks of the Pasig River 6
Figure 2.4. Waste collection coverage across different areas in the Philippines 7
Figure 3.1. Most relevant national provisions on waste and plastic waste, with descriptions 14
Figure 3.2. Summary of Proposed Bills on Plastics and their Target Groups (19th Congress of the Philippines) 15
Figure 3.3. The National Plan of Action for the Prevention, Reduction, and Management of Marine Litter up to 2040 16
Figure 3.4. Overview of the most relevant recent national strategies related to plastic production, consumption, and disposal; the leading institutions; their implementation timeframes; and their main objectives 17
Figure 5.1. Key Steps in formulating the Philippine Plastic Waste Management Roadmap 28
Figure 5.2. The Philippine Plastic Waste Management Roadmap and its outcomes 30
Figure 5.3. Outcomes and Milestones of the Philippine Plastic Waste Management Roadmap 31
Figure 5.4. Short-term Actions (2023–2028, and beyond) – The Philippine Plastic Waste Management Roadmap 34
Figure 5.5. Medium-term Actions (2023–2034, and beyond) in the Philippine Plastic Waste Management Roadmap 38
Figure 5.6. Long-term Actions (2023–2040, and beyond) – The Philippine Plastic Waste Management Roadmap 40
Figure 5.7. Potential interactions among government agencies in implementing the Philippine Plastic Waste Management Roadmap 49
Figure 5.8. Proposed Monitoring, Evaluation, Reporting, and Verification (MERV) Framework – Philippine Plastic Waste Management Roadmap 55

LIST OF TABLES

Table 5.1. Summary of the Barriers and Gaps in Plastic Waste Management 29
Table 5.2. Thematic Approach – Philippine Plastic Waste Roadmap: Addressing the Barriers 44
Table 5.3. Government institutions' potential roles and responsibilities in implementing the Philippine Plastic Waste Management Roadmap 46
Table 5.4. Expected impacts of phasing out of SUPs on stakeholders across the plastic value chain – Philippine Plastic Waste Management Roadmap 51
Table 5.5. Potential funding and financing options for implementing the Roadmap 54
Table 5.6. The most relevant and recent national strategies expected to impact plastic production, consumption, and disposal; the leading agency; and the implementation timeframe 58
Table A.1. Uses for various plastic resins, and their recyclability in the Philippines 67

LIST OF BOXES

Box 4.1. Implementation of standards to improve plastic waste management and promote eco-design 20
Box 4.2. Extended producer responsibility examples 21
Box 4.3. Examples of international best practices for integrating informal workers into solid waste management 22
Box 4.4. Singapore's example of public-private partnerships for waste collection 24
Box 4.5. Examples of best practice waste management information systems 25
Box 5.1. Examples of plastic waste management in island countries with major tourist industries 43

CURRENCY EQUIVALENT

Currency Unit	–	Philippine Peso (₱)
₱1.00	=	$0.0184
$1.00	=	₱54.418

Note: As of January 26, 2023 – Source: Bloomberg.com

In this report, "$" refers to United States dollars.

ACKNOWLEDGEMENTS

The publication describes a timebound Roadmap for Managing Plastic and Phasing-out Single Use Plastics to support the Goal of Zero Plastic Waste Pollution by 2040 in the Philippines, based on analysis of current plastic and waste management practices in the country.

The development of this publication was coordinated by the World Bank's Environment, Natural Resources, and Blue Economy Global Practice, with funding from the World Bank Group.

The team responsible for preparing this publication, led by Junu Shrestha (Senior Environmental Specialist) and Agnes Chung Balota (Senior Environmental Specialist), included the core members: Reynar Rollan (Solid Waste Management Consultant), Hubert Jenny (Technical Consultant), Hyunji Roh (Environmental Consultant), Mercy Amai Emojong (Environmental Specialist), and Rea Uy Epistola (Consultant). Özgül Calicioglu (Environmental Engineer), Benan Berhan (Plastic Policy Consultant), and Mahama Samir Bandaogo (Economist) contributed to the supporting analytical work on alternatives to plastic products and plastic-related fiscal policies. Ann Bishop (Technical Editor) and Sarah Hollis (Designer) played essential roles in the final editing and design. Operational support was provided by Venessa Vaishali Sarkar (Program Assistant).

The preliminary research and consultations were conducted by the consulting firm Environmental Agency Austria in collaboration with the University of the Philippines, involving Francesca Montevecchi and Mikhail Asenov (Environment Agency Austria); Ma. Brida Lea Diola and Maria Antonietta Tanchuling (University of the Philippines).

The team expresses gratitude for the valuable advice provided by the peer reviewers, including Sameer Akbar (Senior Environmental Specialist), Helena Naber (Senior Environmental Specialist), and Jiang Ru (Senior Environmental Specialist). Additional comments were received from Ashraf El-Arini (Senior Environmental Specialist) and Kate Almora Philp (Environmental Engineer). Anjali Acharya (Senior Environmental Specialist) contributed strategic guidance to the study.

Overall, the study received guidance from Ndiamé Diop (Country Director for Brunei, the Philippines, Malaysia, and Thailand) and Mona Sur (Practice Manager, Environment, Natural Resources, and Blue Economy Global Practice).

The study team would like to extend their special thanks to the private and public sector stakeholders in the Philippines who generously dedicated their time to this study. This includes the following government agencies and their representatives: Department of Environmental and Natural Resources; National Solid Waste Management Commission; National Ecology Center; Climate Change Commission, Department of Finance; Department of Trade and Industry; Department of Science and Technology; Department of Health; Department of Labor and Employment; Department of Tourism; Department of Interior and Local Government; and selected Local Government Units.

LIST OF ABBREVIATIONS AND ACRONYMS

3Rs	Reduce, Reuse, and Recycle
AASC	Auditing and Assurance Council
ADB	Asian Development Bank
BOC	Bureau of Customs
BOI	Board of Investments
BSMED	Bureau of Small and Medium Enterprise Development
CCC	Climate Change Commission
CHED	Commission on Higher Education
DA	Department of Agriculture
DBP	Development Bank of the Philippines
DENR	Department of Environment and Natural Resources
DepEd	Department of Education
DILG	Department of the Interior and Local Government
DND	Department of National Defense
DOF	Department of Finance
DOH	Department of Health
DOLE	Department of Labor and Employment
DOST	Department of Science and Technology
DOT	Department of Tourism
DTI	Department of Trade and Industry
DTI-BPS	Department of Trade and Industry-Bureau of Philippine Standards
EBD	Environmental and Biotechnology Division
EMB	Environmental Management Bureau
ENRO	Environment and Natural Resources Office
EPR	Extended producer responsibility
EPS	Expanded polystyrene
ETV	Environmental Technology Verification
EU	European Union
GAA	General Appropriations Act
GAIA	Global Alliance for Incinerator Alternatives
GEF	Global Environment Facility
GHG	Greenhouse gas
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
HB	House Bill
HDPE	High-density polyethylene
HLAs	High-level Actions
HORECA	Hotel, restaurant, and catering (sector)

IEC	Information, education, and communication (campaigns)
IFC	International Finance Corporation
IPO	Intellectual Property Office
IRA	Internal Revenue Allotment
IRR	Implementing Rules and Regulations
ISO	International Organization for Standardization
ITDI	Industrial Technology Development Institute (of DOST)
JICA	Japan International Cooperation Agency
KfW	Kreditanstalt für Wiederaufbau.
LBP	Land Bank of the Philippines
LCA	Life cycle assessment
LDIP	Local Development Investment Program
LDPE	Low-density polyethylene
LLDPE	Linear low-density polyethylene
LGC	Local Government Code
LGU	Local government unit
M&E	Monitoring and evaluation
MDFO	Municipal Development Fund Office
MMDA	Metropolitan Manila Development Authority
MNC	Multinational company
MRF	Material recovery facility
MSD	Materials Science Division
MSMEs	Micro, small, and medium enterprises
MSW	Municipal solid waste
MT/Y	Metric tons per year
NCR	National Capital Region
NDC	Nationally Determined Contribution
NEAP	Non-environmentally acceptable product
NEC	National Ecology Center
NEDA	National Economic and Development Authority
NGO	Nongovernmental organization
NPOA-ML	National Plan of Action for the Prevention, Reduction and Management of Marine Litter
NRH	National Recycling Hub
NSWMC	National Solid Waste Management Commission
NSWMF	National Solid Waste Management Fund
NSWMS	National Solid Waste Management Strategy
O&M	Operations and maintenance
ODA	Official development assistance
PAP4SCP	Philippine Action Plan for Sustainable Consumption and Production
PARMS	Philippine Alliance for Recycling and Materials Sustainability, Inc.
PCIEERD	Philippine Council for Industry, Energy, and Emerging Technology Research and Development
PCX	Plastic Credit Exchange
PDP	Philippine Development Plan

PET	Polyethylene terephthalate
₱	Philippine peso
PIA	Plastic Industries Association
PNB	Philippine National Bank
PP	Polypropylene
PPA	Programs, projects, and activities
PPIA	Philippine Plastics Industry Association
PPP	Public-private partnership
PPPDD	Policy, Planning, and Program Development Division
PRO	Producer responsibility organization
PS	Polystyrene
PTD	Packaging Technology Division
PVC	Polyvinyl chloride
PWCs	Public waste collectors
R&D	Research and development
RA	Republic Act
rHDPE	Recycled high-density polyethylene
rPE	Recycled polyethylene
rPET	Recycled polyethylene terephthalate
rLDPE	Recycled low-density polyethylene
rPOY	Recycled partially oriented yarn
rPP	Recycled polypropylene
rPSF	Recycled polyester staple fiber
S&T	Science and technology
SCP	Sustainable consumption and production
SLF	Sanitary landfill facility
SME	Small and medium enterprise
SPI	Society of the Plastics Industry
SRF	Solid refuse fuel
SUP	Single-use plastic
SWM	Solid waste management
SWMB	Solid Waste Management Board
SWMD	Solid Waste Management Division
SWMO	Solid Waste Management Office
SWMP	Solid Waste Management Plan
TESDA	Technical Education and Skills Development Authority
TWG on CE, SCP, and SUPs	Technical Working Group on the Circular Economy, Sustainable Consumption and Production, and Single-use Plastics
UK	United Kingdom
ULAP	Union of Local Authorities of the Philippines
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
UN-Habitat	United Nations Human Settlements Programme

US	United States
USAID	United States Agency for International Development
$	United States dollar
VA	Voluntary Agreement
VBMF	Volume-based Waste Fee
WCS	Waste Charge System
WWF	World Wildlife Fund

Photo: Shutterstock

EXECUTIVE SUMMARY

The growing plastic waste problem in the Philippines

Plastic waste has become a serious threat in Southeast Asia because of its adverse environmental, health, and economic impacts. Single-use plastics (SUPs) are a major concern in countries such as the Philippines due to SUPs' extensive use and significant production, which has resulted from economic growth, increasing availability, and consumers' desire for convenience.

In 2019, Filipinos used more than 163 million plastic sachets, 48 million shopping bags, and 45 million thin-film bags (GAIA 2019). Of the estimated 1.7 million metric tons (MTs) of post-consumer plastic waste generated in the Philippines every year, 33 percent is deposited in landfills and dumpsites, and 35 percent is discarded on open land. A significant amount leaks into waterways and the ocean (WWF Philippines, Cyclos GmbH, and AMH Philippines 2020).

The government of the Philippines has adopted several important measures to combat the negative impacts of mismanaged plastic waste. The principal law governing plastic waste management is the Ecological Solid Waste Management Act of 2000 (Republic Act No. 9003), which is supplemented by the Philippine Development Plan (PDP) 2023–2028; the Extended Producer Responsibility Act of 2022 (Republic Act 11898); and the ordinances passed by at least 489 of the country's 1,634 local government units (LGUs) to regulate the use of plastic bags and expanded polystyrene. In addition to these legal instruments, the government developed the National Plan of Action for the Prevention, Reduction, and Management of Marine Litter (NPOA-ML), which has the goal of achieving *Zero Waste to Philippine Waters by 2040*. However, despite these strong measures, plastic waste pollution continues to be a serious problem across the Philippines.

The World Bank, in response to a request from the government of the Philippines, developed this Roadmap to pave the way for attaining the goal of *Zero Plastic Waste Pollution by 2040*.

Background on Plastic and Solid Waste Management in the Philippines

In consultation with stakeholders, an assessment of the plastic and solid waste sector revealed gaps and barriers regarding: (1) policy and institutions, (2) analytical and infrastructure, (3) finance and funding, and (4) data and information.

With regard to policy, important laws that promote the reduction of plastic consumption and the adoption of eco-designed alternatives have yet to be passed, and the laws that have been passed still need to be implemented. The committed participation of both the private sector and consumers is crucial for reducing plastic consumption and waste generation, as well as the adoption of eco-designed alternatives. As the current Philippine industry-led initiatives on the Circular Economy primarily target recycling or substituting plastic products with other single-use products, these initiatives need to be complemented with reductions in consumption. Enforcement also needs to be improved for the industry-specific collection and take-back requirements that apply to the significant amounts of plastic materials that are reaching their end-use.

The low waste collection rate achieved by the LGUs and barangays can be partially attributed to their limited institutional capacity and financial resources to implement the requirements of RA 9003. While SWM collection and management is a basic service that the LGU needs to provide, many still need to establish a local Environment and Natural Resources Office (ENRO) with adequately trained staff who can effectively oversee solid waste management.

The need for adequate facilities for carrying out waste collection and treatment is substantial in metropolitan areas in the Philippines, and even more so in remote and underdeveloped areas. RA 9003 requires that all barangays, or clusters of barangays, establish a material recovery facility (MRF), which is the primary formal infrastructure for the recovery of recyclables. In 2021, within Metro Manila, a mere 20 percent of barangays had operational MRFs, while the national average stood at approximately 44 percent. This deficiency significantly impedes the proper retrieval of recyclable materials from municipal solid waste.

As the LGUs are unable to segregate and collect all of their solid waste, the informal waste sector, which comprises individuals, families, groups, and small and medium-sized enterprises (SMEs), plays a crucial role in the recovery of waste materials for recycling, either on a full-time or part-time basis. While no comprehensive, national-level assessment has been conducted regarding the number, capacity, and spatial distribution of the junk shops[1] involved in recovery for recycling, estimates suggest that they handle approximately 28 percent of the waste diverted from landfills in the Philippines (NSWMC 2009). These informal establishments are estimated to process up to 50 percent of all the plastic materials collected for recycling (World Bank 2021). The average collection ratio for municipal solid waste in the Philippines is low, at about 40 percent; however, the rate varies significantly across different regions, depending on their socio-economic conditions. Metropolitan areas have the highest collection rates (above 90 percent), whereas 3rd to 6th class municipalities,[2] including those in developing and remote areas, have collection rates below 30 percent.

Data available on the National Solid Waste Management Commission (NSWMC) website show that 22,638 MTs of waste are deposited, daily, in 279 functioning sanitary landfills (SLFs). These SLFs provide services for 567 of the 1,634 LGUs in the Philippines. These statistics show that approximately two-thirds of the LGUs in the Philippines (1,067 of them), are not complying with RA 9003. This non-compliance is likely a result of these LGUs' lack of access to SLFs, and to the related disposal services mandated by the law. Currently, the infrastructure available in the Philippines for the collection and recovery of recyclables, recycling, and disposal are not sufficient to cope with the increasing generation of plastic and solid waste in the country. Thus, the social and behavioral change and the availability of financing for the technologies that recyclers use needs to improve.

The LGUs need more effective cost-recovery mechanisms for waste management. The limited funds from the National Tax Allotment, the fees charged to commercial establishments, and the penalties imposed for waste violations are not enough to pay for acquiring and maintaining solid waste management (SWM) equipment and facilities, training SWM staff, and paying staff salaries.

Currently, there is no systematic method in place in the Philippines for the collection and presentation of data at the local, regional, or national levels on waste generation, collection, treatment, and disposal. Furthermore, critical data on buyers, sellers, recyclables, and pricing for recycled plastics; the extent of littering and marine pollution; suitable alternatives to the SUPs specific to the Philippines; and the adverse impacts of plastic consumption, are notably scarce, and not readily accessible for the public.

The Roadmap

To address the identified gaps and barriers in plastic waste management in the Philippines, a Roadmap has been developed that provides a systematic and detailed sequence of Actions, Milestones, and Outcomes for relevant government agencies and other key stakeholders to follow in supporting the reduction of non-recyclable SUPs, and improving waste management. This Roadmap uses a phased, evidence-based, and holistic approach to address SUP pollution along the plastic value chain, from SUPs' production, through their consumption, to their collection, and recycling or disposal. The Roadmap also proposes Actions to close the gaps in plastic waste management in the Philippines, and progressively decrease plastic pollution. Thus, the Roadmap is intended to help the country move toward a more Circular Economy, while providing better plastic waste management. Also, the Roadmap's Actions have been carefully crafted, prioritized, and timed based on consideration of stakeholders' current capacities, but the Actions also anticipate that stakeholders' capacities will improve over the Roadmap's three six-year terms. This strategic approach will be based on policy assessments, evaluation of implementation, and consultations with stakeholders.

Given the evident problem of plastic waste leakage in the Philippines, as well as the long-standing, unaddressed weaknesses in current waste collection, segregation, and recycling systems, the Roadmap places significant emphasis on tackling these downstream problems within the plastic

1 In the Philippines, small recovery for recycling centers known as "junk shops" buy recyclables from individual garbage collectors and resell them to bigger aggregators and processing plants.

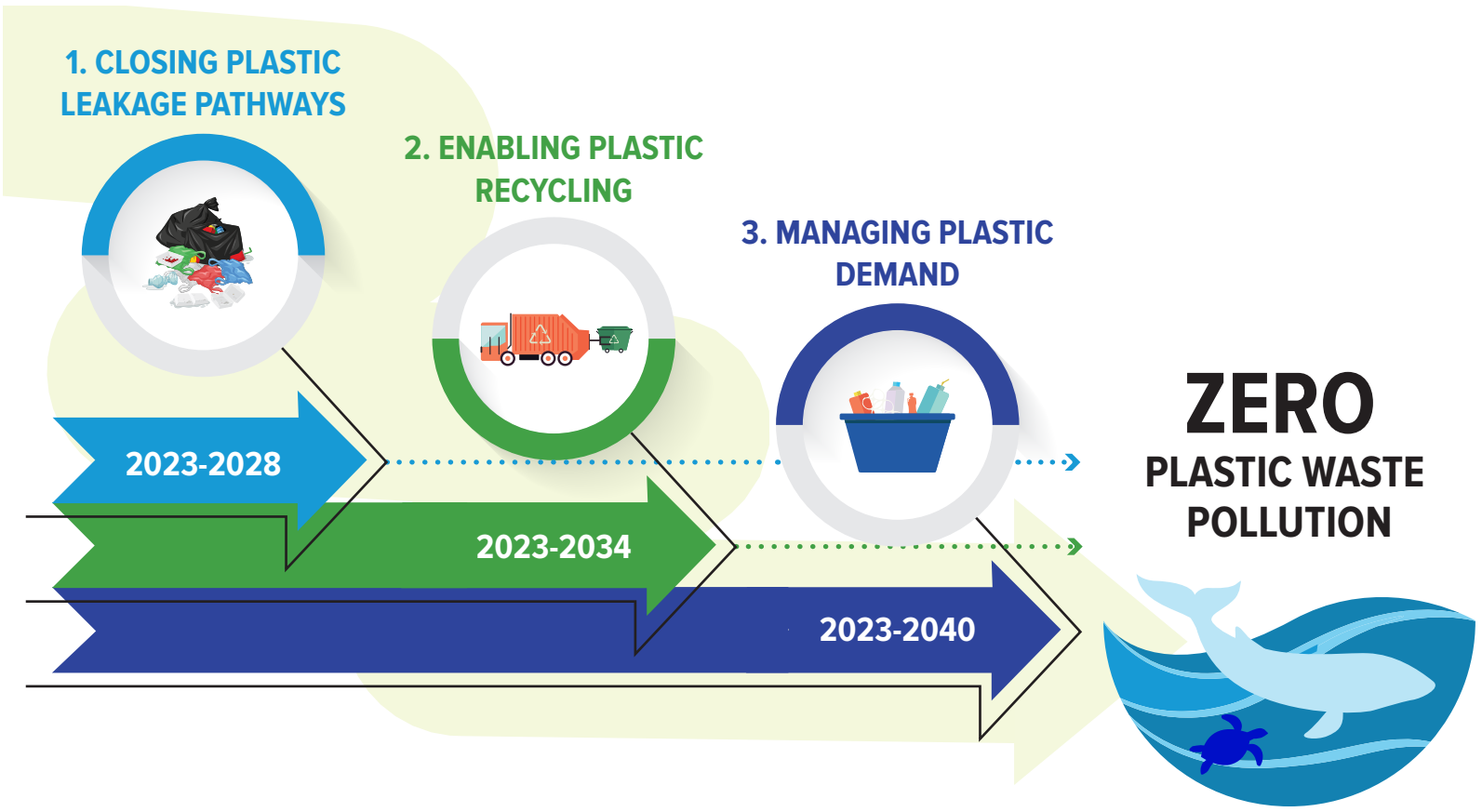
2 Municipalities are divided into income classes that are based on their average annual income over the previous four calendar years: 1st class: at least Philippine pesos (₱) 55 million; 2nd class: ₱45–55 million; 3rd class: ₱35–45 million; 4th class: ₱25–35 million; 5th class: ₱15–25 million; and 6th class: less than ₱1 million.

value chain. From the outset, the Roadmap prioritizes urban areas because more than half of the country's waste is generated in urban areas, and with their better solid waste management systems, urban areas will be better able to implement the Roadmap's Actions.

As noted above, it is expected that more complex strategies, which require advanced technical skills, capacity, and regulatory systems will be implemented at later stages in the Roadmap's timeline. This sequencing of increasingly complex Outcomes over the stages of the Roadmap is expected to progressively reduce waste leakage, gradually increase recycling rates, and continuously improve the design of plastic products. Additionally, the Roadmap's Actions are attuned to the realities of waste management in the country. For example, the developers of the Roadmap recognize the indispensable role played by the informal waste sector in separating, collecting, and recycling plastic waste; and, thus, the Roadmap includes Actions to integrate and support the informal sector in the LGUs' solid waste systems. The Roadmap also aims to enhance the institutional capacity of the LGUs to manage waste collection and treatment.

As shown in Figure E.1, below, the Roadmap provides three strategic pathways of overlapping and time-bound target Outcomes. These Outcomes will be attained through a set of Actions and Milestones that need to be implemented over three six-year terms—the first of which is from 2023 to 2028. All of the interrelated Actions start in 2023, and they are expected to continue beyond their time-bound Milestones so that they carry on their efforts to achieve and sustain the Roadmap's goal of *Zero Plastic Waste Pollution by 2040*. Thus, after the Milestones for short-term Outcome 1—*Plastic Leakage Pathways Closed*—have been achieved in 2028, its Actions are expected to continue. Similarly, for mid-term Outcome 2—*Plastic Recycling Enabled*—the implementation of its Actions should continue after its Milestones have been achieved in 2034. For long-term Outcome 3—*Demand for Plastics Managed and Products Designed for Circularity by 2040*—its Actions, which start at various times, and end in 2040, are based on achieving the required prerequisites. The synergy achieved through the Roadmap's interlinked Actions is expected to result in significant improvements in plastic waste management, and to help realize the Roadmap's 2040 goal in a sustainable manner.

FIGURE E.1. THE PHILIPPINE PLASTIC WASTE MANAGEMENT ROADMAP AND ITS OUTCOMES



As discussed below, a set of Actions will be taken to reach the combined Milestones that lead to achieving the targeted Outcomes of the Roadmap.

Short-term Actions and Milestones: Outcome 1—Plastic Leakage Pathways Closed by 2028

The short-term Actions presented below are expected to contribute to achieving Outcome 1—Plastic Leakage Pathways Closed by 2028. This success is expected to be realized through enhancing the LGUs' waste collection and recovery processes. Achieving the Outcome of stopping plastic leakage into the environment at the collection, recycling, and disposal stages of the LGUs' SWM systems requires successfully carrying out the Actions for the following five Milestones:

Actions	Milestones	Outcome
A1.1.1. Strengthen the regulatory framework to reduce non-recyclable SUPs through enforcing existing and new regulations on SUPs, plastics, and SWM **A1.1.2.** Enforce the provisions of the EPR Law **A1.1.3.** Increase the waste management capacity of selected priority sectors such as tourism **A1.1.4.** Develop understanding of the distributional impacts of SWM and plastic policies, laws, and regulations, and how to minimize negative impacts	**Non-Recyclable SUPs are Reduced (M1.1)**	 **Plastic Leakage Pathways Closed by 2028**
A1.2.1. Audit LGUs' waste collection systems to identify facilities that could be the focus for short- and medium-term Actions for increasing recovery **A1.2.2.** Conduct an audit to develop an inventory of the existing MRFs, recycling facilities, and sanitary landfill sites **A1.2.3.** Improve plastic and solid waste collection, including procuring waste collection vehicles **A1.2.4.** Train SWM facility staff on O&M to improve their performance in recovery or recycling plastic waste **A1.2.5.** Conduct feasibility studies to plan investments for designing and constructing additional MRFs, recycling facilities, and regional SLFs	**Plastic Recovery from Existing Facilities is Increased (M1.2)**	
A1.3.1. Enact the laws that support the reduction of non-recyclable SUPs: the SUP Bag Tax Act, the SUP Product Registration Act, and the Plastic Labeling Act **A1.3.2.** Amend Section VIII of RA 9003's IRR in the NSWM Framework to raise awareness about plastic waste, its impacts, and sustainable alternatives	**Complementary SWM Legislation is Enacted (M1.3)**	
A1.4.1. Design a database on plastic recovery and recycling **A1.4.2.** Publish data on waste collection, recovered recyclables, processed biodegradables, disposed of waste, and recycled plastic	**National Database on Recycling and SWM is Set Up and Operationalized (M1.4)**	
A1.5.1. Survey LGUs and the private sector regarding the waste collection fees they charge businesses **A1.5.2.** Prepare technical guidelines on cost-recovery mechanisms for plastic waste management	**Technical Guidelines on a Cost-recovery Mechanism for Plastics and SWM are Adopted and Enforced (M1.5)**	

Medium-term Actions and Milestones: Outcome 2—Plastic Recycling Enabled by 2034

The medium-term Actions presented below are expected to deliver Outcome 2—*Plastic Recycling Enabled by 2034*. This Outcome is expected to be realized through creating an enabling environment for plastic recycling in the Philippines and fulfilling the following three Milestones.

Actions	Milestones	Outcome
A2.1.1. Build the capacity of the LGUs with staff training on how to prepare feasibility studies **A2.1.2.** Establish new centralized MRFs, recovery or recycling facilities, and regional SLFs **A2.1.3.** Establish a local SWM Office in each LGU, as authorized by the national LGU SWM Plan **A2.1.4.** Develop O&M standards for MRFs, and an operations manual for barangays' SWM Committees **A2.1.5.** Increase staff in the SWM Division of the DENR-EMB, and improve their technical capacity	**LGUs' Capacity to Carry Out Plastic and Solid Waste Management is Developed (M2.1)**	 **Plastic Recycling Enabled by 2034**
A2.2.1. Prepare guidelines for the recognition, integration, and / or support of informal workers, including interventions for those displaced in the LGUs' SWM system **A2.2.2.** Issue minimum technical operating standards for junk shops **A2.2.3.** Pilot SWM projects that promote the integration of informal workers	**Informal Sector is Integrated into the LGUs' SWM Systems (M2.2)**	
A2.3.1. Develop national standards for the quality of plastic recyclates **A2.3.2.** Increase the capacity of recycling facilities **A2.3.3.** Establish a plastic certification scheme for plastic recyclers	**Production of Good Quality Plastic Recyclates is Increased (M2.3)**	

Long-term Actions and Milestones: Outcome 3—Demand for Plastics Managed and Products Designed for Circularity by 2040

The long-term Actions are expected to deliver Outcome 3—*Demand for Plastics Managed and Products Designed for Circularity by 2040*. These Actions start at various times, and are expected to build on the achievement of the short- and medium-term Outcomes. These include enhancement of the design of plastic products, the incorporation of advanced technologies to manage plastic waste, and progressively shifting toward achieving full plastic circularity. Outcome 3 is expected to be realized through fulfilling the following three Milestones:

Actions	Milestones	Outcome
A3.1.1. Conduct life cycle assessments to identify options for eco-designs, eco-labeling, and alternatives to SUPs, in the short term **A3.1.2.** Develop and issue guidelines for compliance on eco-design and Green Public Procurement, in the medium term **A3.1.3.** Initiate on-product and on-packaging information about proper plastic waste disposal, as a long-term Action	**Measures for Eco-design, Eco-labeling, SUP Alternatives, and Green Public Procurement that Promote Plastics' Circularity are Adopted and Enforced (M3.1)**	 **Demand for Plastics Managed and Products Designed for Circularity by 2040**
A3.2.1. Define standards and guidelines to implement the EPR Law, in the short term **A3.2.2.** Assist micro, small, and medium enterprises to participate in an EPR program, in the medium term **A3.2.3.** Negotiate voluntary agreements with the private sector on eco-design, in the long term	**Private Sector is Engaged in Plastic Reduction and Waste Management (M3.2)**	

Actions	Milestones	Outcome
A3.3.1. Develop and implement a communication strategy on plastic waste management **A3.3.2.** Conduct feasibility studies to implement energy recovery technologies that adhere to the environmental laws and other relevant policies **A3.3.3.** Establish a National Recycling Hub (NRH) to support partnerships, and share information among the Roadmap's diverse stakeholders	**Support for Nurturing In-country Innovation and Incentivizing Information Exchanges is Strengthened (M3.3)**	 **Demand for Plastics Managed and Products Designed for Circularity by 2040**

In addition to the primary Actions and Milestones for each pathway in the Roadmap, High-level Actions (HLAs) have been formulated that cut across the three Outcomes to support and facilitate the implementation of the Roadmap. Under HLA1, the government agencies carrying out the Roadmap's Actions would regularly monitor and evaluate the Roadmap's Actions, and report on the results. Under HLA2, to facilitate the LGUs' access to funding sources, government procedures would be improved to simplify the requirements and guidelines for loan and grant applications. Under HLA3, a Stakeholders' Engagement Plan would be initiated to assist with the overall implementation of the Roadmap; define the principles for the communication strategy on plastic waste management; and assess how various SWM regulations impact different populations, and the responses needed to minimize any negative impacts.

Throughout the duration of the Roadmap, the governmental entities responsible for the execution of the prescribed Actions are expected to utilize their internal monitoring and evaluation (M&E) systems to assess their outcomes, and provide reports to the NSWMC. External evaluations could be conducted in 2028, 2034, and 2040 to validate the overall progress made in implementing the Roadmap. These evaluations would entail comparing the Roadmap's technical and economic outcomes with its baseline data, while also considering its non-quantifiable and indirect consequences. Based on these external evaluations, potential adjustments to the Roadmap's Actions and Milestones could be recommended.

The task of managing plastic waste effectively and reduction of non-recyclable SUPs in the Philippines is daunting, but it is attainable. Through the effective collaboration of national government agencies, local governments, the private sector, informal workers, nongovernmental organizations, and consumers, the Roadmap will be a powerful tool for achieving a future that is free from plastic waste pollution.

1. INTRODUCTION

1.1 The Plastic Waste Problem in the Philippines

Plastic waste has become a serious threat in Southeast Asia because of its adverse environmental, health, and economic impacts. Single-use plastics (SUPs) are of particular concern due to their widespread use and substantial volume. In the Philippines, as a result of changing consumption patterns and the growing economy, the country has been experiencing a rise in the use of SUPs. In 2019, the Global Alliance for Incinerator Alternatives (GAIA) reported that on a daily basis, Filipinos used more than 163 million plastic sachets,[3] 48 million shopping bags, and 45 million thin-film bags (GAIA 2019). About 1.7 million metric tons (MTs) of post-consumer plastic waste are generated in the Philippines every year. About 33 percent of this goes to landfills and dumpsites; around 35 percent is dumped on open land, and often burned, which produces toxic smoke; and a significant amount of plastic waste leaks into waterways and the ocean (WWF Philippines, Cyclos GmbH, and AMH Philippines 2020).

The Philippine government has adopted several important measures to combat the negative impacts of plastic waste. These are intended to promote sustainable economic growth, while at the same time reduce the consumption of plastic products. The principal policy governing plastic waste management is the Ecological Solid Waste Management Act of 2000 (Republic Act 9003), which is supplemented by the Philippine Development Plan (PDP) 2023–2028; the Extended Producer Responsibility Act of 2022 (Republic Act 11898); and the ordinances that have been passed by at least 489 of the country's 1,634 local government units (LGUs) to ban or regulate the use of plastic bags and expanded polystyrene, which is used for take-away cups and food containers.

The government's most relevant strategy concerning plastic waste management is the National Plan of Action for the Prevention, Reduction, and Management of Marine Litter (NPOA-ML), which was adopted in 2021 through a memorandum prepared by the Department of Environment and Natural Resources (DENR 2021). The goal of the NPOA-ML is achieving *Zero Waste to Philippine Waters by 2040*, and government agencies, including the LGUs, are responsible for implementing the NPOA-ML's policies.

However, despite the Philippines' strong measures to combat plastic waste pollution, it continues to be a serious problem across the Philippines. Since plastic waste is a component of solid waste, improving plastic waste management requires improving solid waste management, overall.

The significant factors that contribute to the growing leakage of SUPs into the environment in the Philippines are the lack of reusable plastic products; inadequate collection and separation of waste at its source; and inadequate recycling, waste treatment, and waste disposal facilities and operations.

A roadmap that assigns a precise and detailed sequence of Actions, Milestones, and Outcomes to relevant government agencies is needed to support the reduction of non-recyclable SUPs, improve waste management, and contribute to achieving the goal of *Zero Plastic Waste Pollution by 2040*. This Roadmap must align with the Philippines' waste and

3 Sachets are small packages of shampoo, liquid soap, instant coffee, and other personal and household products.

waste management laws, regulations, and strategies, and be appropriate for the country, given its level of plastic waste management and financial resources.

The World Bank, in response to a request from the Philippine government, crafted this Roadmap, to pave the way for attaining the goal of Zero Plastic Waste Pollution by 2040. It assigns a systematic and detailed sequence of Actions, Milestones, and Outcomes to relevant government agencies and key stakeholders to support the reduction of non-recyclable SUPs and improve waste management.

Due to the environmental, economic, and public health threat of mismanaged, the World Bank has made reducing solid waste and plastic waste pollution a worldwide priority. At both regional and national levels, the World Bank provides analytical, policy, and capacity development support, as well as institutional strengthening, partnerships, and investments to improve solid waste and recycling infrastructure (World Bank 2018a).

Since 2018, the World Bank has conducted activities to reduce marine plastics in East Asia and the Pacific, in general, and specifically in Association of Southeast Asian Nations (ASEAN) countries, including the Philippines. In the Philippines, the World Bank has conducted the following studies to support the government's efforts to reduce marine plastics:

- *Philippines: Plastic Diagnostics, Field and Remote Sensing, River Monitoring, and Microplastics Assessments* (2023c). This study used images recorded with drones and field surveys to identify the top 10 plastic items floating in the Pasig River.
- *Market Study for the Philippines: Plastics Circularity Opportunities and Barriers* (World Bank Group 2021b): This study looked at the entire plastic value chain in the Philippines to identify challenges and opportunities to achieve circularity in managing plastic waste.
- *Reducing Plastic Waste in the Philippines: An Assessment of Policies and Regulations to Guide Country Dialogue and Facilitate Action* (World Bank Group 2022c): This study analyzed policy options to reduce, reuse, and recycle plastics, and stimulate the development of alternatives for priority plastic items.
- *An Assessment of Municipal Solid Waste Plans, Collection, Recycling, and Disposal of Metro Manila* (World Bank 2021a): This study assessed SWM in Metropolitan (Metro) Manila, and it identified the priority investments to make in Metro Manila's LGUs.
- *Combating the Plastic Waste Crisis in the Philippines: Implementing Extended Producer Responsibility with Lessons Learned from Korea* (World Bank 2023a): This study, which distilled the lessons learned in Korea over 20 years of effectively reducing the littering of plastic waste, and increasing recycling though implementing extended producer responsibility (EPR), provides guidance for national and local decision-makers in the Philippines on how to design and implement effective and affordable EPR systems to improve plastic waste management.

1.2 Methodology and Approach

The formulation of the Roadmap was undertaken with the following three steps:

1. Gathering, processing, and analyzing information to identify gaps and barriers in the Philippines' strategies and plans related plastic waste management, in particular, and solid waste management (SWM), in general;
2. Developing strategies and action plans to address the barriers and gaps in plastic waste management; and
3. Using a consultative approach to design and improve the Roadmap through holding public consultations with stakeholders.

Under the first step, an assessment was conducted to determine the baseline for plastic waste management-related information in the Philippines. The sources for this comprised reports and data on waste management in the Philippines; current and anticipated legislation; scientific literature on plastics and plastic pollution; field studies on plastic pollution; and consultations with relevant stakeholders in government, private enterprise, financial institutions, nongovernmental organizations (NGOs), and international development agencies.

Information for the Roadmap was gathered across the plastic value chain:

- The upstream stage focused on activities related to plastics' production (alternative materials and substitutions), as well as packaging and product design (redesigned solutions).
- The midstream stage focused on the logistics of plastics' delivery from wholesalers to retailers, to the consumers who use plastic products for various purposes.
- The downstream stage focused on the end-of-life stage of plastics to minimize their negative environmental and public health impacts.

Understanding all of the stages in the plastic value chain is essential for achieving the Roadmap's goal of *Zero Plastic Waste Pollution by 2040*. However, given the extent of plastic waste leakage into the environment in the Philippines, in developing the Roadmap, the midstream and downstream stages were prioritized. Improvements in managing plastic waste at these two stages are expected to achieve the greatest results in the short term, while at the

Given the extent of plastic waste leakage into the environment in the Philippines, in developing the Roadmap, the midstream and downstream stages were prioritized. Improvements in managing plastic waste at these two stages are expected to achieve the greatest results in the short term.

same time, this would prepare for improving the production of plastics and alternatives at the upstream stage.

The plastic value chain and effective SWM are closely linked. This combination is a key success factor for addressing the negative environmental and public health impacts of plastic waste, and capitalizing on its socio-economic potential through recycling and recovery. This can reduce the reliance on virgin plastics, conserve resources, promote circularity (the reuse and regeneration of materials and products), and create business and employment opportunities.

Following the World Bank team's assessment, they organized the information for the Roadmap into crucial focus areas: the status of waste management and recycling; the types of plastic waste, including the most polluting SUPs; current and proposed legislation, regulations, and institutional setups, including the roles and responsibilities of the relevant government agencies; plans, policies, and regulations concerning plastic products and plastic waste; the mobilization of finance for waste management, in general, and plastic waste, in particular; alternatives for SUPs and their potential negative impacts; current initiatives related to the production of plastics, and to plastic waste management; key stakeholders; and the expected impact of plastic-related policies.

As noted above, as part of the initial assessment, consultations were held with various stakeholders to get their inputs for the Roadmap. These stakeholders included the Climate Change Commission (CCC); Department of Environment and Natural Resources (DENR); Department of the Interior and Local Government (DILG); Department of Finance (DOF); Department of Science and Technology (DOST); Department of Tourism (DOT); Department of Trade and Industry (DTI); the LGUs through their respective leagues (League of Cities of the Philippines, League of Municipalities of the Philippines, and League of Provinces of the Philippines); the National Economic and Development Authority (NEDA); National Solid Waste Management Commission (NSWMC); House of Representatives Committees on Climate Change and on Ecology; Senate Committee on Environment, Natural Resources, and Climate Change; and relevant international development agency, NGO, and industry groups, including the Philippine Alliance for Recycling and Materials Sustainability (PARMS), Inc., and the Philippine Plastics Industry Association (PPIA), Inc.

The discussions with stakeholders achieved agreement about the current status, barriers, and gaps in plastic waste management, and on the Actions, Milestones, Outcomes, and Goal for the Roadmap. Among the topics discussed with stakeholders were the reduction of non-recyclable SUPs, and the related processes and impacts; the development of alternatives to SUPs and the markets for these; the promotion of research and innovation on eco-design; the readiness of relevant sectors to implement various elements of the Roadmap; and multi-sectoral perspectives on EPR.

1.3 Structure of the Report

This report on the Roadmap is organized into five sections and five annexes. Following this first Section, which introduced the plastic waste problem in the Philippines, and the methodology used to develop the Roadmap, Section 2 presents an assessment of plastic and solid waste management in the Philippines.

Section 3 assesses the current sector strategies for plastic and solid waste management in the Philippines by examining the institutional arrangements and the upcoming legislation on plastics and SWM. Section 4 summarizes the results of stakeholder consultations that were held to identify the gaps and barriers in the waste management sector, and Section 5 presents the Roadmap and provides recommendations on how to overcome these barriers in waste and plastic waste management.

The report is supported by five annexes: Annex A discusses the key types of plastic resin used in the Philippines, their uses, and the extent of their recycling; Annex B presents the Roadmap's proposed Actions, lead stakeholders, supporters, funding sources, and timelines; Annex C on the institutional set up for the Roadmap describes the roles of the different government agencies that would be involved in implementing the Roadmap, including the LGUs; Annex D discusses the consultations that were held with stakeholders in developing and refining the Roadmap; and Annex E discusses the three external evaluations that should be conducted to validate the internal monitoring and evaluation that the government agencies implementing the Roadmap would undertake.

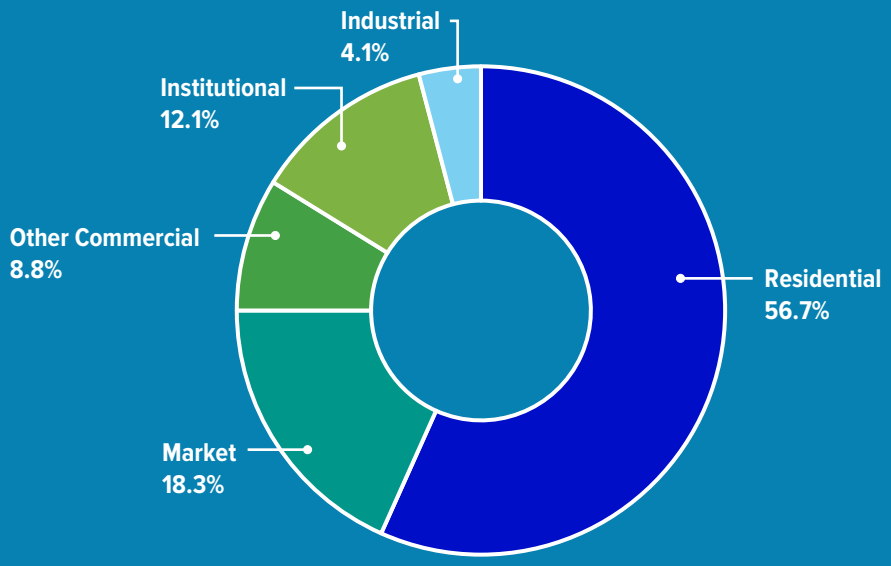
Photo: Shutterstock/MDV Edwards

2. BACKGROUND: PLASTIC AND WASTE MANAGEMENT – PHILIPPINES

2.1 Solid and Plastic Waste Generation and Collection

The Philippines is an archipelago of more than 7,600 islands, which is subdivided into 17 regions, 81 provinces, 1,634 LGUs (cities and municipalities), and 146 chartered cities. Based on reports provided by local governments, there are significant differences in the amount of waste generated and collected across the country. On average, the amount of waste generated, per capita, per day, is 0.4 kilograms (kg) (DENR 2018). In 2022, this resulted in total waste generation of approximately 21.4 million metric tons (NSWMC 2022a). Some 10.55 percent of municipal solid waste (MSW), or about 2.1 million metric tons, per year (MT/Y), is recyclable plastic—polyethylene terephthalate (PET) bottles and high-density polyethylene (HDPE) containers. Recyclable waste does not include SUPs such as sachets and plastic bags, which are considered residual waste. As indicated in Figure 2.1, more than half of the waste generated in the Philippines comes from residential sources (DENR 2018).

FIGURE 2.1. PERCENTAGES FOR THE MAIN SOURCES OF WASTE IN THE PHILIPPINES

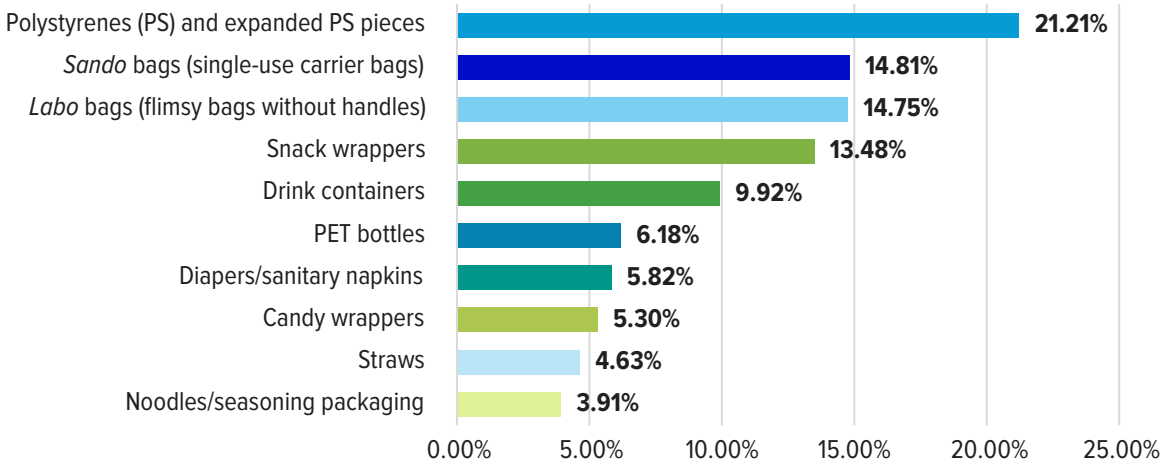


Source: Department of Environment and Natural Resources 2018

A study on plastic packaging waste in the Philippines (WWF Philippines, Cyclos GmbH, and AMH Philippines 2020) revealed that 760,000 MT, or 35 percent of all plastic waste, leaks into the environment, and only 9 percent is recycled. A World Bank study (World Bank 2021c) found that the top 10 plastic items of litter within, and on the banks of the Pasig River comprised polystyrenes (PS) and expanded PS pieces,[4] *sando* bags (single-use carrier bags), *labo* bags (flimsy bags without handles), snack wrappers, drink containers, PET bottles, diapers/sanitary napkins, candy wrappers, straws, and noodles/seasoning packaging (see Figure 2.2). Almost two-thirds (63 percent) of plastic litter comprised plastic packaging with no tangible market value, and these items are incompatible with standard recycling processes (Figure 2.3).

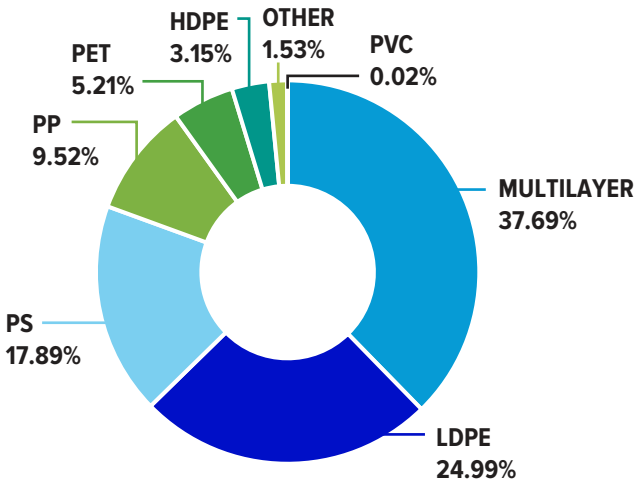
The National Capital Region (NCR), Metro Manila, and nearby Calabarzon collectively make up 25% of the 2020 population[5] of the Philippines and generate about 32 percent of the waste produced in the country.[6] If the

FIGURE 2.2. TOP 10 MOST COMMON PLASTIC ITEMS WITHIN, AND ON THE BANKS OF THE PASIG RIVER



Source: World Bank 2021c

FIGURE 2.3. PERCENTAGES FOR THE TOP 10 PLASTIC ITEMS WITHIN, AND ON THE BANKS OF THE PASIG RIVER



Source: World Bank 2021c

4 EPS is a thermal insulator used both for preserving and transporting animal protein (such as fish). SUPs with EPS include food boxes and single-use plastic cups, and especially cups for hot beverages. With improper disposal, EPS tends to break down into smaller pieces that are light enough to float on water.

5 According to the Philippine Statistics Authority's 2020 Census, the region of Calabarzon was the most populous one in the country, with more than 14.4 million inhabitants. This was followed by the National Capital Region (NCR) with 13.5 million inhabitants. After the NCR, Calabarzon was the country's second most densely populated region (Philippine Statistics Authority 2021).

6 NSWMC (National Solid Waste Management Commission (nd) Projected Waste Generation from 2020 to 2025. https://app.powerbi.com/view?r=eyJrIjoiNjc4OTE2OT-ktMDdhMC00YzM1LTkwMjEtYWUxMDIyMjI0MWMwIiwidCI6ImY2ZjRhNjkyLTQzYjMtNDMzYi05MmIyLTY1YzRlNmNjZDkyMCIsImMiOjEwfQ%3D%3D&pageName=ReportSection&fbclid=IwAR264Sfm3ocnSBovLnpGgdSKXljXQeGAx9JpZIxcAS3YyV4voqVpHzPTBNw

Philippines' population increases at the current rate, the country could generate 23.6 million MT of waste by 2025.[7,8] The average collection ratio for municipal solid waste in the Philippines is low, at about 40 percent. As shown in Figure 2.4, this ratio varies significantly across different regions, depending on their socio-economic conditions.[9]

Metropolitan areas have higher collection rates (above 90 percent), whereas 3rd to 6th class municipalities, including those in developing and remote areas, have collection rates below 30 percent (WWF Philippines, Cyclos GmbH, and AMH Philippines 2020).[10]

2.2 Municipal Solid Waste Segregation, Collection, Treatment, and Disposal

Republic Act 9003 provides the necessary policy framework, institutional mechanisms, and mandate to enable the LGUs to significantly reduce their solid waste by developing and implementing integrated SWM plans that are based on the 3Rs (*Reduce, Reuse, and Recycle*). To have their SWM plans approved by the National Solid Waste Management Commission (NSWMC), the LGUs must plan to divert at least 50 percent of their waste. Consistent with the Local Government Code (LGC), RA 9003 assigns the LGUs with the primary responsibility to implement and enforce the segregation and collection of MSW at the *barangay* level.[11] This applies specifically to biodegradable, compostable, and reusable wastes. The collection of non-recyclable materials and special wastes remains the responsibility of the LGUs. The section that follows focuses on the status of MSW segregation, collection, treatment, and disposal related to plastic waste.

RA 9003 requires that all barangays, or clusters of barangays, establish a material recovery facility (MRF), which is the primary formal infrastructure for the recovery of recyclables. The MRFs would then sell the materials they recover to junk shops, which would sort, pack, and sell the recyclables to consolidators or recycling companies. However, not all barangays have established an MRF because they lack the necessary space and financing. In Metro Manila, in 2021, only 20 percent of the barangays operated an MRF, while nationally, this figure rose to about 44 percent. Centralized MRFs process waste from a group of LGUs and nearby barangays, and in Metro Manila, there are 13 of these facilities. Along with recovering recyclables,

FIGURE 2.4. WASTE COLLECTION COVERAGE ACROSS DIFFERENT AREAS IN THE PHILIPPINES

Source: WWF Philippines, Cyclos GmbH, and AMH Philippines 2020

7 This projection did not include the impact of the COVID-19 pandemic, which was expected to increase the use of plastics for take away food and personal protective and medical equipment (face masks and shields, gloves, sanitizers, respirators, syringes, and related equipment).

8 The projected amount for waste generated is likely to be an underestimate as it does not take into account the results of the latest waste analysis and characterization study, and the increase in the region's gross domestic product. All of these factors contribute to higher, per capita, waste generation (World Bank 2021a).

9 Waste collection coverage identifies the percentage of the population that is served by waste collection services.

10 Municipalities are divided into income classes that are based on their average annual income over the previous four calendar years: 1st class: at least Philippine pesos (₱) 55 million; 2nd class: ₱45–55 million; 3rd class: ₱35–45 million; 4th class: ₱25–35 million; 5th class: ₱15–25 million; and 6th class: less than ₱1 million.

11 The barangay is the smallest administrative division in the Philippines.

these centralized MRFs also carry out the composting of waste (World Bank 2021a).

Most suppliers of locally-recycled plastic resins in the Philippines are small and medium enterprises (SMEs), and the majority are located within Metro Manila.[12] This means that the Philippines has little recycling capacity outside of Manila. The recycling technologies used for plastics comprise: (i) electric plastic densifiers with a capacity of 4 kg/day (for polyethylene (PE) plastic bags); (ii) plastic shredders for soft plastics such as plastic bags and sachets; (iii) plastic extrusion to flakes or pellets for molders; and (iv) pyrolizers for the thermal processing of industrial plastic waste. A World Bank study carried out in 2019, estimated that the Philippines recycles only 28 percent of its crucial plastic resins (World Bank 2021b).[13] As a result, "78 percent of the material value of plastics is lost to the Philippine economy each year, and the market failure for plastics recycling leads to a plastic material value loss of $790–$890 million, per year (WWF Philippines, Cyclos GmbH, and AMH Philippines 2020)."[14] An increase in recycling capacity, and in the availability of recycling technologies is necessary to boost the Philippines' recycling ratio.

Data on the NSWMC website show that 22,638 MTs of waste are deposited, daily, in 279 operational sanitary landfills (SLFs). These disposal facilities serve 567 out of the Philippines' 1,634 LGUs, which in 2022, was about one-third of all the LGUs.[15] These figures indicate that about two-thirds of Philippine LGUs (1,067) do not comply with RA 9003 as they lack access to, and the services of, sanitary landfills. As of 2019, about 489 LGUs (fewer than 30 percent of all the cities and municipalities in the Philippines) had passed ordinances banning or regulating the sale and use of plastic bags and expanded polystyrene (EPS) foam. The primary objective of these bans is preventing pollution and the clogging of waterways that can cause flooding.[16] In Barangay Nagerong, Lazi City, and the Visayas Islands, small convenience stores (sari-sari shops) are prohibited from using plastic packaging for their products. In 2013, the city of Santa Rosa in Laguna Province initiated and gradually implemented a "no plastic policy," which included SUPs and Styrofoam. Metropolitan Manila Development Authority (MMDA) Regulation N° 99-009 (the Anti-Littering Law) also prohibits the littering/dumping/throwing of garbage, rubbish, or any other waste in open public places.

2.3 The Informal Waste Sector

As the LGUs are unable to segregate and collect all their solid waste, informal waste pickers play a crucial role in separating, collecting, and recycling plastics in the Philippines. Informal collectors voluntarily work in MSW to recover recyclables, and this allows local governments to save on the time and resources they spend on waste collection and disposal.

The National Solid Waste Management Strategy (NSWMS) 2012–2016 (NSWMC 2011) refers to the informal waste sector as "individuals, families, groups, or SMEs engaged in the recovery of waste materials, with revenue generation as the motivation, either on a full-time or part-time basis. Members of this sector are classified as itinerant waste buyers, jumpers at collection trucks, garbage crew, waste reclaimers, and small and illegal junkshops." Even though no national-level formal assessment has been conducted of junk shops' number, capacity, and spatial distribution, these are estimated to handle 20 percent of the Philippines' diverted waste (NSWMC 2009), and process up to 50 percent of all of the plastic materials collected for recycling (World Bank 2021b). Most junk shops are concentrated in highly urbanized areas such as Metro Manila, where there are at least 1,268 of them (World Bank 2021a).

The informal waste sector only collects plastic resins with higher market value (2023). These comprise polyethylene terephthalate (PET), polypropylene (PP), and high-density polyethylene (HDPE). The high-value plastic waste collected by junk shops is sold to larger consolidators or brought to recycling plants in the larger provinces such as Cebu (World Bank 2021c). As the informal sector does this trading, no comprehensive data are available on the quantities and types of plastic traded, and their respective value. Although under RA 9003, waste picking and unauthorized waste segregation activities are prohibited due to the health and safety hazards inherent with this work, thousands of informal workers have no alternative as they lack the education and job opportunities to do anything else. As their work is prohibited, these key SWM stakeholders have no legal rights.

12 As data were not systematically collected, the actual numbers could differ.

13 Polyethylene terephthalate (PET), excluding PET polyester, polypropylene (PP), high-density polyethylene (HDPE), and linear low-density polyethylene/low-density polyethylene (LLDPE/LDPE).

14 The significant difference between the two recycling rates—9 percent and 28 percent—may, to some extent, be explained by the different methodologies used in the studies. The World Bank looked at key resins (World Bank 2021b), whereas the estimations of the World Wildlife Fund and its co-authors were based on applications and materials (WWF Philippines, Cyclos GmbH, and AMH Philippines 2020).

15 NSWMC (National Solid Waste Management Commission). n.d. "Operational Sanitary Landfill: Actual Waste Received (Tons Per Day) By Operator/Project Name."

16 Among these LGUs are the cities of Muntinlupa, Quezon, and Pasig in Metro Manila, and the municipalities of Los Baños, Laguna, Burgos, Ilocos Sur, and San Marcos, in Isabela Province.

2.4 Financing Waste Management

In the Philippines, the funding sources for capital investments and the operation of the LGUs' waste management systems are:

1. Fiscal transfers from the central government to the LGUs that occur through the National Tax Allotment (NTA): In accord with the LGC of the Philippines (RA 7160), the allocation of funding is based on an LGU's population and land area. The NTA is set at 40 percent of all the national taxes collected over three years prior to the current year.
2. The LGUs' revenues from taxes, fees, and charges such as property and business taxes, licensing fees, and so on, which go into the LGU's General Fund: In accord with the LGC and RA 9003, the LGUs can also collect payments from their constituents for services rendered such as waste collection and management, but data analyzed for the Roadmap show that only a few LGUs collect SWM fees.

The funds for SWM projects are derived from 20 percent of the annual NTA provided to the LGUs. The amount allocated for SWM depends on the priorities of the respective LGU. As a result, the SWM systems of the LGUs are limited to basic waste collection, their collection vehicles and MRFs are poorly maintained, and disposal takes place in marginally operated sites. Lack of funds also restricts the LGUs' ability to construct and operate the required material recovery and recycling facilities.

According to RA 9003, the LGUs are required to impose waste collection fees on the commercial establishments that cannot operate their own SWM system. Although residential areas produce the bulk of solid waste (56.7 percent), very few LGUs impose waste collection fees in residential areas (DENR 2018). Data on the revenues generated through the imposition of fines for violating local SWM ordinances are not available, but such payments are likely to be minimal due to the LGUs' inadequate implementation of national and local SWM regulations.

Other financing mechanisms for waste management are anticipated under RA 9003, which prescribes establishing a SWM Fund financed by fines, penalties, grants, donations, and the annual General Appropriations Act (GAA).[17] This fund, which could catalyze broad-based, large-scale SWM interventions, could cover (a) products, facilities, technologies, and processes to enhance SWM; (b) awards; (c) incentives; (d) research programs; (e) information, education, communication campaigns, and monitoring activities; (f) technical assistance; and, (g) capacity-building activities. However, as of mid-2023, no SWM Funds had been established as no guidelines for these had been issued.

Through the Mandanas Ruling of 2018, the LGUs are expected to receive a more significant share of the revenues collected through national taxes, which they could then employ to fund waste management (World Bank 2021d).[18] The National Tax Allotment and other local resources could cover the cost of providing the services and facilities enumerated in the LGC, but since the LGUs can designate this budget for any activity they choose (public health, education, and so on), there is no guarantee they will allocate the money for waste management, in general, and plastic waste, in particular. The LGUs clearly need more funding than what they currently spend on waste management.

In addition to official development assistance, another financing option for an LGU is a public-private partnership (PPP). This is a financing vehicle that can be used by either national government agencies or LGUs, and it has the following key characteristics:[19]

- **Public assets**—PPPs deliver public goods, assets, and services by bundling the provision of public assets (new or existing ones) with associated services for a specific period.
- **Long-term contractual arrangement**—PPPs that provide financing for infrastructure or services are typically for a long period (10 to 30 years).
- **Private investment**—PPPs can mobilize private and commercial finance to pay the upfront capital costs for infrastructure.
- **Risk transfer**—Responsibilities and risks are shared equally between the public and private partners.
- **Performance-based contract**—PPP contracts are performance-based and output-based, rather than input-based. Thus, a PPP links remuneration of the private operator to its performance, and penalties are charged for poor performance or failing to deliver the required services.

17 The General Appropriations Act (GAA) is annual financing allocated by the Philippine Congress in specific amounts for salaries, wages, and other personnel benefits; maintenance and other operating expenses; and capital outlays for the implementation of all programs/projects and activities in government departments, bureaus, and offices. All agencies and offices prepare annual estimates for their expenditures and submit this to Congress.

18 The Mandanas Ruling of 2018 adjusted the LGUs' share from national taxes to include the collection (customs duties) from the Bureau of Customs. The revenue allotment of the LGUs is expected to increase by 27.6 percent, which is equivalent to 1.03 percent of the Philippines' gross domestic product (GDP). In line with the Mandanas Ruling, Executive Order No. 138, Series of 2021 was issued, which requires that by 2024, the national government agencies (NGAs) fully devolve the functions identified in the 1991 LGC and succeeding laws. The DENR environmental services related to SWM that have been devolved to the LGUs include the enforcement of the pollution control law (Provinces); the solid waste disposal system or environmental management system (Cities/Municipalities); and solid waste collection services and facilities (Barangays).

19 Adapted from the World Bank's 2017 publication, *Public-Private Partnerships: Reference Guide, Version 3*.

2.5 Plastic Resins, SUPs, and Alternatives

In 2015, the four plastic resins—low-density polyethylene (LDPE), high-density polyethylene (HDPE), polypropylene (PP), and polyethylene terephthalate (PET)—comprised 80 to 93 percent of all plastic resins consumed in the Philippines (WWF Philippines, Cyclos GmbH, and AMH Philippines 2020). Polyvinyl chloride (PVC) and polystyrene (PS) comprised the remaining 7 to 20 percent (World Bank 2021b). The information on using various resins and their recyclability is discussed in Annex A.

The Philippines produced about 900,000 MT of HDPE/LDPE, PP, and PVC in 2019. Domestic demand for these critical resins was only about 34 percent. Due to the lack of local capacity to produce PET resins, the Philippines is highly dependent on imports. As a result, starting in 2021 (World Bank 2021b), the country planned to increase domestic capacity to produce virgin resins by at least 360,000 MT (250,000 MT of HDPE/LDPE and 110,000 MT of PP). Reduction of low-value and hard-to-recycle plastics requires the introduction of suitable and environmentally sustainable alternatives. Some of the alternatives to SUPs include:

- **Multi-use, reusable, and refillable products:** These durable products, which can be reused multiple times, include water dispensers, bulk dispensers for dry food, refillable dispensers for soap and detergent, and reusable cutlery and cups. Consumer inconvenience and lack of hygiene standards and regulations, including adequate water supply and wastewater management are the most significant barriers to the widespread use of these products.
- **Single-use, non-plastic alternatives:** These are typically made from materials such as starch, paper, bamboo, banana leaves, and palm leaves. These can be sourced domestically, but there are concerns related to shelf life and potential contamination and this is especially the case with products used for food packaging.
- **Single-use, compostable plastic:** Plastic products made from resins with better environmental performance could be considered as alternatives. For instance, SUPs could be produced by substituting one resin with another that is in higher demand on the recycling market, and that is less likely to be littered. In the Philippines, the production of compostable plastic is limited, and comprises only a small proportion of the commercially available packaging. In addition, there is no facility for exclusively treating compostable plastic.

Compostable and biodegradable products could be suitable; however, many of these products require special conditions and temperatures for decomposition. If these products are not collected, properly, and industrially processed, they are not biodegradable, they behave like plastic, and they can contribute significantly to littering.

In considering alternatives, it is essential to evaluate the information available on the impacts of a product throughout its life cycle (Government of Canada 2021). A comparative life cycle analysis of plastic carrying bags and single-use paper bags in the Philippines, which was conducted for the Department of Science and Technology, showed that the plastic bags were more environmentally friendly than paper bags with regard to global warming, acidification, human toxicity, and photochemical ozone creation (Biona et al. 2015).

The World Bank's Plastic Substitution Tradeoff Estimator[20] was used in the Philippines to compare the impacts of 10 major plastic products with up to four potential substitutes for each one, and the results of this comparison are presented in a supplement to this report—"External Costs of Common Plastics and Alternatives in the Philippines." The Estimator provided an External Cost Analysis, which was developed by quantifying and monetizing the effects that substituting an alternative for a plastic product would have on societal and environmental welfare. The key findings of the Estimator's analysis in the Philippines were as follows:

The Philippines produced about 900,000 MT of HDPE/LDPE, PP, and PVC in 2019. Domestic demand for these critical resins was only about 34 percent. Due to the lack of local capacity to produce PET resins, the Philippines is highly dependent on imports. As a result, starting in 2021, the country planned to increase domestic capacity to produce virgin resins by at least 360,000 MT (250,000 MT of HDPE/LDPE and 110,000 MT of PP).

20 The Plastic Substitution Tradeoff Estimator is an innovative tool that can inform target setting by estimating the external costs of 10 plastic products and their alternatives across their lifespan. The model can identify which materials, or a combination of them, will perform best in different circumstances. The Estimator can also assess the trade-offs between plastics and their alternatives to help establish targets for reduction and substitution (Arri and Peszko 2022).

- Substituting single-use PET beverage bottles 100 percent with alternatives such as reusable glass bottles and reusable PP bottles could achieve almost 100 percent improvement in the environmental footprint of the SUP bottles.
- Of the options, the best alternative to single-use EPS beverage cups and food containers is multi-use PP.
- Reusable LDPE bags that have a lifespan of 44 uses, nominal external costs, and a nominal environmental footprint are the best alternative to shopping/carrier bags.
- Multi-use chromium steel utensils are an alternative that has the least monetized external cost when compared to single-use, bio-based PP, and single-use disposable wood utensils. Some environmentally conscious customers take re-usable utensils with them when they are planning to eat take-out food.
- A multi-use PET/PE/PP container, which is used as a replacement for a food wrapper, has the lowest external cost and the best environmental impact when compared with an aluminum foil or single-use bio-LDPE wrapper. The use of aluminum foil or a PET/PE/PP container may result in food spoiling more quickly than if it is wrapped with PVC.
- Refillable PET/PE/PP containers offer a better alternative to sachets, although the feasibility of achieving 100 percent substitution depends on government policy and consumers' willingness.
- Reusable glass bottles are the most suitable alternative to multi-material (plastic laminated) beverage cartons.

Interpreting the results from the Plastic Substitution Tradeoff Estimator, and determining the most suitable alternative/s for a product, requires expert knowledge about the current local waste and recycling conditions.

Photo: Shutterstock/junpinzon

3. CURRENT SECTOR STRATEGY – PLASTIC AND SOLID WASTE MANAGEMENT

3.1 Institutional Arrangements and Responsibilities

The Department of Environment and Natural Resources (DENR) is the key government agency responsible for waste management in the Philippines, and its components are the Environmental Management Bureau (EMB), the Solid Waste Management Division (SWMD), and the Policy, Planning, and Program Development Division (PPPDD). The Ecological Solid Waste Management Act of 2000 (Republic Act 9003) mandated the establishment of the National Solid Waste Management Commission (NSWMC), which is the government entity in charge of implementing RA 9003's Rules and Regulations. The EMB hosts the NSWMC Secretariat, it published the National Solid Waste Management Strategy 2012–2016 (NSWMC 2011), it standardized national guidelines for waste management, and it approves local SWM plans and regulations. Municipal, city, and provincial SWM Boards and Environment and Natural Resources Offices (ENROs) are responsible for delivering solid waste and plastic waste management services.

The implementation of RA 9003 requires a systematic, comprehensive, and ecologically sound solid waste management plan (SWMP) that is applied from the national level down to the barangay level. RA 9003 also requires the segregation of solid waste at its source. From 2001 to 2006, the LGUs were expected to divert at least 25 percent of their solid waste from disposal into recovery or recycling. In 2022, based on the Philippine Development Plan 2017–2022, the target diversion rate rose to 80 percent. In addition, the act regulates the coding system for packaging materials and products to facilitate waste recycling and reuse, but this system has yet to be developed (mid-2023).[21] As a precursor to the coding system, a list is being developed of the non-environmentally acceptable products (NEAPs) that will be prohibited in the Philippines. Alternatives to these NEAPs must be available in the Philippines, and cost no more than 10 percent above the NEAPs they are replacing. Concerning NSWMC Resolution No. 1363 of 2020, which directs the DENR to prepare and implement a ban of unnecessary SUPs, and 1428 of 2021 declaring plastic drinking straws and coffee stirrers as NEAPs, DENR was still formulating the implementation guidelines as of 2023. Notably, these resolutions do not ban unnecessary SUPs, nationwide, and for SUPs to be banned, they must be included in the list of NEAPs.

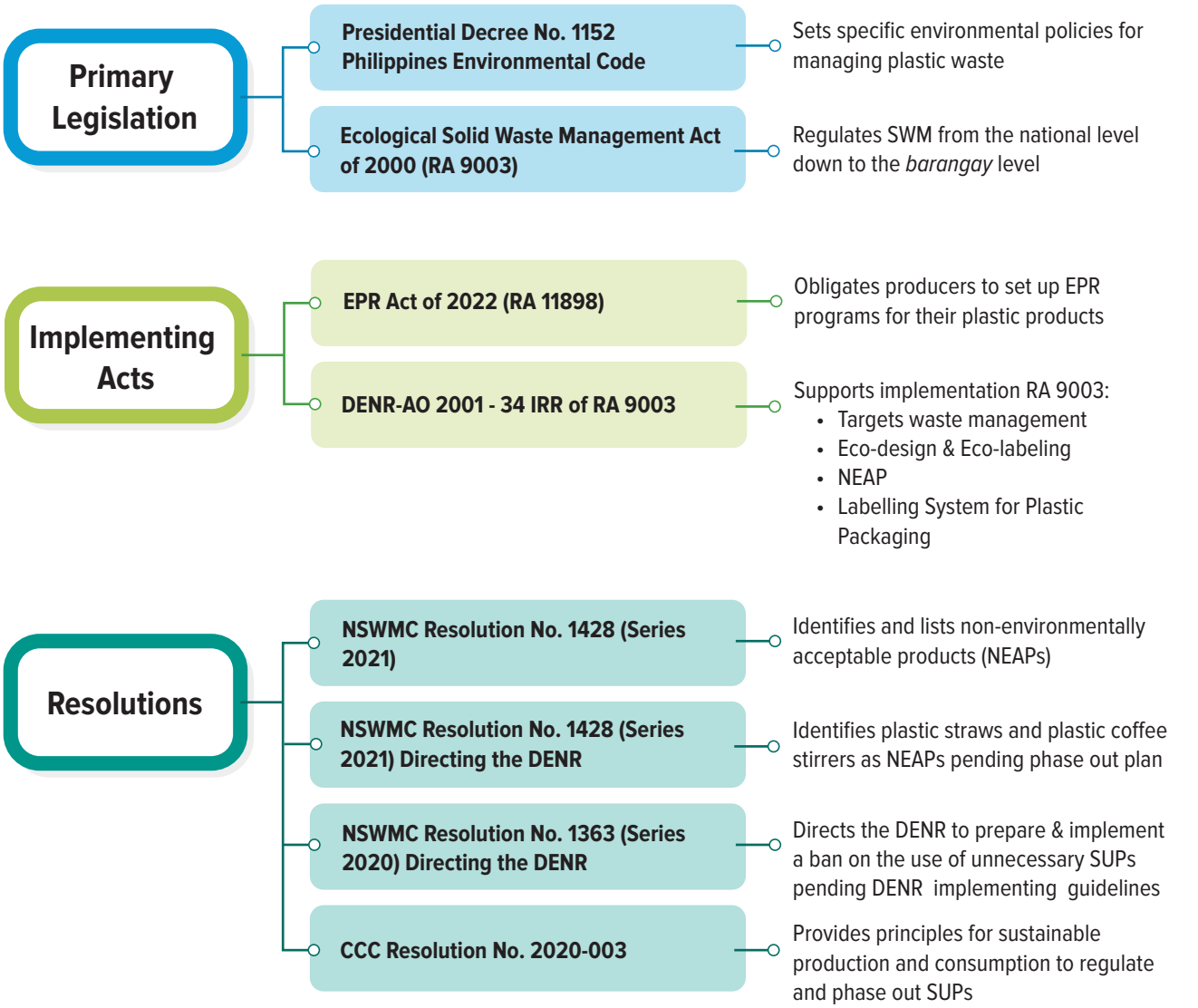
21 The Implementing Rules and Regulations for RA 9003 require that the coding system used is that of the International Organization for Standardization (ISO) standards' series ISO 14020, and particularly ISO 14024.

In addition to RA 9003, and Resolutions No. 1363 and 1428 banning NEAPS, several other regulations and policies are intended to eliminate plastic waste and promote the sustainable production and consumption of plastics, Green Public Procurement, eco-labeling, and the 3Rs:

- The Philippine Green Jobs Act of 2016 (RA 10771) incentivizes enterprises to provide green (environmentally friendly) jobs.
- The Extended Producer Responsibility Act (EPR-RA 11898), which became law in July 2022, obligates producers to assume full financial responsibility for treating the waste from their products and packaging over their lifespan, and once they reach their end-of-life.
- The Cabinet Cluster on Climate Change Adaptation, Mitigation, and Disaster Risk Reduction (CCAM-DRR) approved Cabinet Cluster Resolution No. 1 on January 27, 2021, on Adopting the Principles of Sustainable Consumption and Production (SCP), Towards Regulation and Phase-out of Single-use Plastics and a Responsible Transition to the Use of Environment-friendly Products.

Figure 3.1 presents an overview of the Philippine government's most relevant national provisions on waste and plastic waste, and their prescriptions with regard to primary legislation, implementing acts, and resolutions.

FIGURE 3.1. MOST RELEVANT NATIONAL PROVISIONS ON WASTE AND PLASTIC WASTE, WITH DESCRIPTIONS



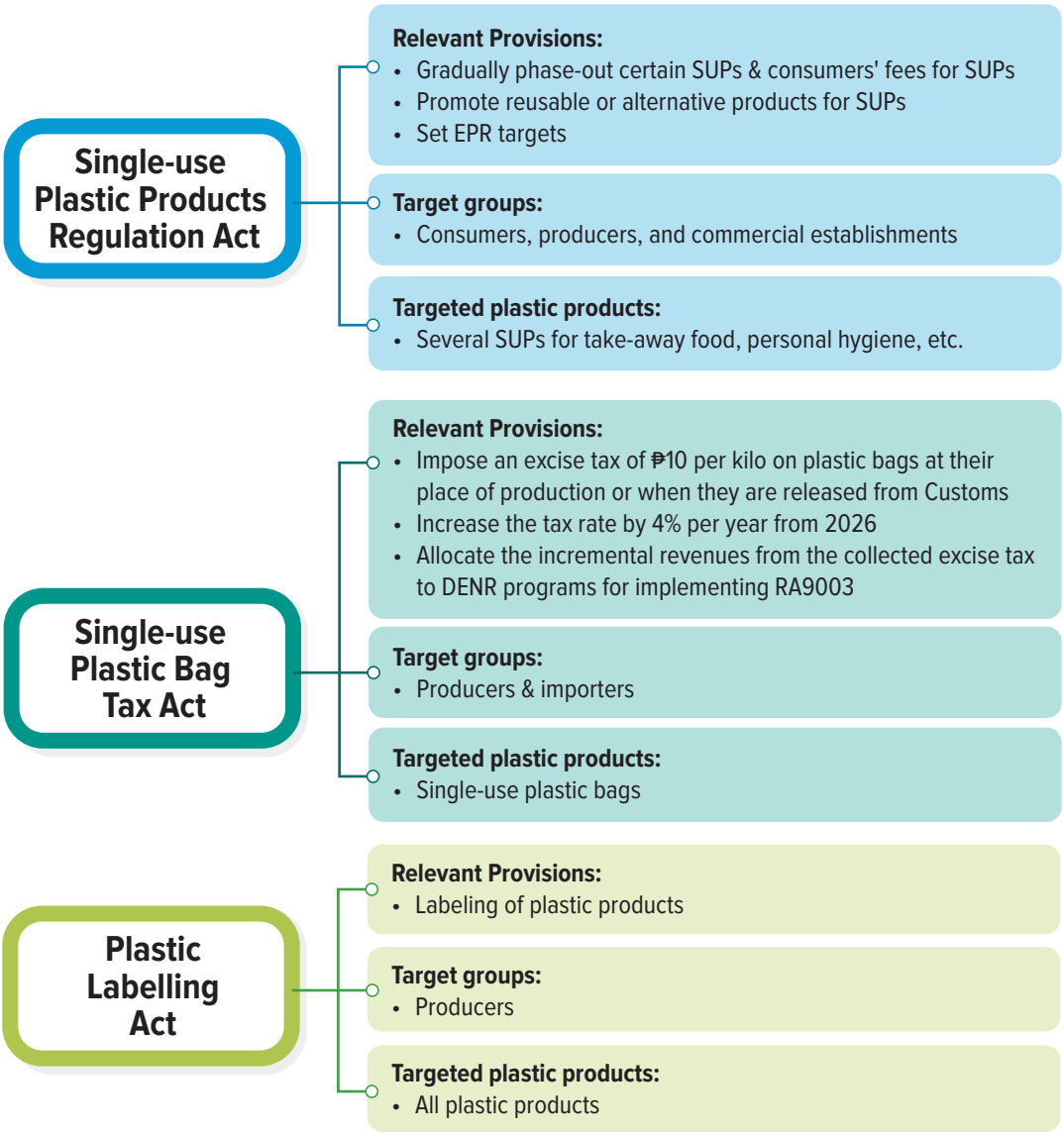
Notes: AO = Administrative Order; CCC = Climate Change Commission; DENR = Department of Environment and Natural Resources; EPR = extended producer responsibility; IRR = Implementing Rules and Regulations; NEAP = non-environmentally acceptable product; NSWMC = National Solid Waste Management Commission; RA = Republic Act; SUP = single-use plastic; SWM = solid waste management.

Source: World Bank

3.2 Forthcoming Regulations on Plastic Waste

Some legislation and regulations concerning plastics and SUPs have been developed, but they still need to be adopted. The proposed plastic-related bills are intended to provide a holistic policy framework for restricting or prohibiting the use of problematic SUPs. Legislative reforms on solid waste and plastic waste management, which gained momentum in the 18th Congress of the Philippines (2019–2022), were promoted through three related bills on: phasing out SUPs and plastic bags, imposing an excise tax on plastic bags, and implementing EPR. During the 18th Congress, the proposed Single-use Plastic Products Regulation Act (HB 9147) was approved by the House of Representatives, but not by the Senate. The proposed Plastic Bags Tax Act (HB 9171) was approved by the House of Representatives on the Third Reading, and transmitted to the Senate on July 29, 2021. The Senate Committee conducted a hearing on HB 9171 on April 25, 2022, but the bill did not pass the First Reading during the 18th Congress. The EPR Law, which was passed on July 23, 2022, prescribes progressively increasing plastic recovery targets: December 31, 2023 (20 percent); December 31, 2024 (40 percent); December 31, 2025 (50 percent); December 31, 2026 (60 percent); December 31, 2027 (70 percent); December 31, 2028 (80 percent) and every year, thereafter.

FIGURE 3.2. SUMMARY OF PROPOSED BILLS ON PLASTICS AND THEIR TARGET GROUPS (19TH CONGRESS OF THE PHILIPPINES)



Notes: DENR = Department of Environment and Natural Resources; EPR = extended producer responsibility; RA = Republic Act; SUP = single-use plastic.

Source: World Bank

In the 19th Congress, which was underway in 2023, 25 plastic waste-related bills were filed in the House of Representatives, and two counterpart bills were filed in the Senate to phase out or regulate SUPs and impose an excise tax on them. House Bill (HB) 04102—An Act Imposing Excise Tax on Plastic Bags, Thereby Adding New Sections 150-C and 288 (H) in the National Internal Revenue Code of 1997—was approved by the House of Representatives on November 14, 2022, and passed on to the Senate.

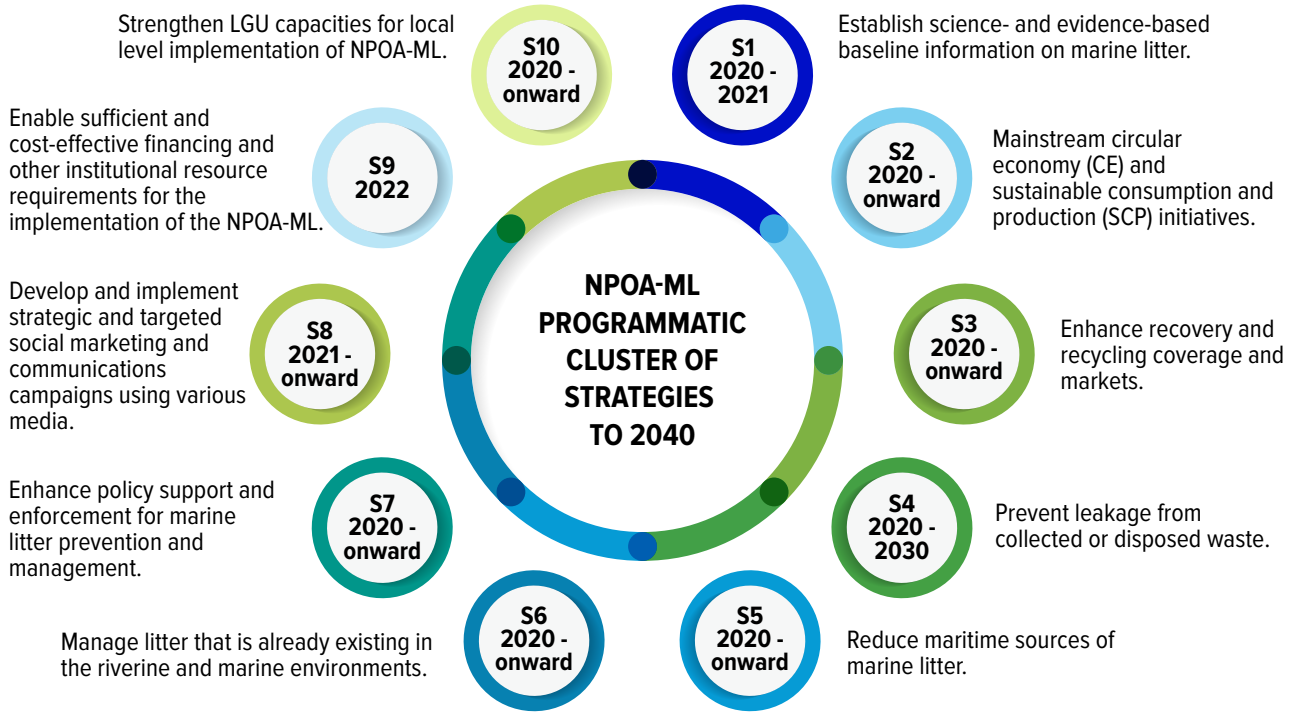
Although not yet in force, the proposed legislation listed above shows that the Philippines' government is serious about tackling plastic waste. The Roadmap presented in this report serves as a guide for government agencies in undertaking actions that build on the existing policies, legislation, and regulations, and that can be readily implemented using a step-by-step approach. Furthermore, the Roadmap has been strategically formulated to remain relevant whether or not there is any progress with the ongoing legislative process to phase out SUPs. A list of the bills proposed in the 19th Congress and their objectives is presented in Figure 3.2.

3.3 Strategies for Plastic and Waste Management

In addition to the legal framework, the government and the private sector have developed several strategies and plans to address plastic waste, and waste management, overall. The most relevant strategy is the National Plan of Action for the Prevention, Reduction, and Management of Marine Litter (NPOA-ML), which the DENR adopted through Memorandum Circular 2021-10 on August 5, 2021. The NPOA-ML is intended to achieve the goal of *Zero Waste to Philippine Waters by 2040,* and it calls on the relevant government agencies to issue policy instruments (circulars and orders) to manage implementing the plan in accord with their responsibilities. The NPOA-ML provides a strong foundation for implementing this Roadmap to manage plastic waste, and reduce non-recyclable SUPs until the reduction of land-based plastic litter meets the government's goals. As shown in Figure 3.3, the NPOA-ML comprises 10 programmatic strategy clusters.

Some national agencies and private sector entities have set their own targets that comprise sustainable consumption and production, national waste objectives and targets, and the sustainability and circularity of the plastics industry. The essential features of these other Philippine strategies and their implementation timelines are presented in Figure 3.4.

FIGURE 3.3. THE NATIONAL PLAN OF ACTION FOR THE PREVENTION, REDUCTION, AND MANAGEMENT OF MARINE LITTER UP TO 2040



Source: World Bank

FIGURE 3.4. OVERVIEW OF THE MOST RELEVANT RECENT NATIONAL STRATEGIES RELATED TO PLASTIC PRODUCTION, CONSUMPTION, AND DISPOSAL; THE LEADING INSTITUTIONS; THEIR IMPLEMENTATION TIMEFRAMES; AND THEIR MAIN OBJECTIVES

National Plan of Action for the Prevention, Reduction and Management of Marine Litter (DENR-EMB)

2021-2040

Overarching goal "Zero Waste to Philippine Waters by 2040" through shared responsibility, accountability, and participatory governance

Sustainable Science and Technology Solid Waste Management Roadmap (DOST, PCIEERD)

2022-2026

Industry compliance with SWM regulations, and minimization of waste generation

Philippine Action Plan for Sustainable Consumption and Production (NEDA)

2020-2040

Sustainable consumption and production through business models for waste minimization and innovation hubs, EPR, and banning SUPs

Philippine Plastics Industry Roadmap (PPIA, DTI-BOI)

2014-2030

Development and strengthening of the plastics recycling industry, targets for recovery and recycling (2022: 20%; 2030: 60%); Inclusion of the informal waste sector

Philippines Development Plan (NEDA)

2017-2022

National waste diversion rate targets (80% by 2022)

2023-2028:

Waste minimization initiatives (EPR Law and NPOA-ML)

Zero Waste to Nature: Ambisyon 2030 Roadmap (PARMS)

2021-2030

Strategies to achieve zero waste with industrial and post-consumer packaging

25-year Solid Waste Management Master Plan (MMDA)

2022-2046

Facilities development through PPP, SWM policy development program, stakeholder engagement, behavioral change, and institutional strengthening

Simulation Packaging Testing Laboratory (SPTL) and Green Packaging Laboratory (GPL) (DOST-ITDI -PTD)

2022-2032

Reduce environmental impact packaging materials; Develop locally produced biodegradable and bioplastic; Establish circular system/technologies for packaging

Notes: DENR = Department of Environment and Natural Resources; DENR-EMB = Department of Environment and Natural Resources-Environmental Management Bureau; DOST = Department of Science and Technology; EPR = extended producer responsibility; ITDI = Industrial Technology Development Institute; MMDA = Metropolitan Manila Development Authority; NEDA = National Economic and Development Authority; PARMS = Philippines Alliance for Recycling and Materials Sustainability; PCIEERD = Philippines Council for Industry, Energy, and Emerging Technology Research and Development; PPIA = Philippine Plastics Industry Association; PPP = public-private partnership; PTD = Packaging Technology Division; SUP = single-use plastic; SWM = solid waste management.

Source: World Bank

Photo: Shutterstock/Wachiwit

4. BARRIERS IN PLASTIC WASTE MANAGEMENT

An analysis of the status of plastic waste management in the Philippines identified the barriers along the plastic value chain and in the waste management system that contribute to the littering of large amounts of SUPs and other plastic waste. In order to explain the rationale for the Actions, Milestones, and Outcomes, which are presented in Section 5 of this report, this section discusses the barriers, which are categorized under four different headings: (i) Policy and Institutional; (ii) Analytical and Infrastructure; (iii) Financial and Funding; and (iv) Data and Information.

4.1 Policy and Institutional Barriers

Policies are needed that promote reducing plastic consumption and adopting eco-designed alternatives. The proposed legislative framework that is intended to encourage the reduction of plastic consumption, reduce the generation of plastic waste and littering, and promote the adoption of eco-designed alternatives, still needs to be developed and adopted. As noted in Section 3.2, some of the bills debated during the 18th Congress to address these issues still have to be enacted,[22] including ones to reduce the consumption of SUPs.

About one third of the LGUs in Philippines have passed ordinances banning or regulating the sale and use of plastic bags and polystyrene foam; however, the results from the plastic littering field studies, which the World Bank conducted in 2021, show that more efforts are needed to tackle the plastic waste problem and reduce marine littering (World Bank 2021d). Hence, policies must be more comprehensively implemented that promote the participation of both the private sector and consumers in reducing plastic consumption and waste generation, and adopting eco-designed alternatives.

Box 4.1 presents examples from the European Union (EU) and the International Organization for Standardization (ISO) on best practices for implementing standards to improve plastic waste management and promote eco-design.

22 The Single-Use Plastic Products Regulation Act (HB 9147 and SB 2262), Single-Use Plastic Bag Tax Act (HB 9171), and 2020 NSWMC Resolution No. 1363, all direct the DENR to prepare and implement banning the use of unnecessary single-use plastics when adopted and put in effect.

BOX 4.1.
IMPLEMENTATION OF STANDARDS TO IMPROVE PLASTIC WASTE MANAGEMENT AND PROMOTE ECO-DESIGN

The EU Ecolabel, which was launched in 1992, is the European Union (EU) voluntary label for environmental excellence, and it certifies that goods and services meet high environmental standards across all stages of their life span, from raw material extraction, through production and distribution, to disposal.

The criteria for the EU Ecolabel were developed and reviewed by the European Commission in cooperation with the EU Member States and other stakeholders, which included consumer organizations, industry experts, and environmental NGOs. The EU Ecolabel criteria require that a product or service is market-oriented, simple to understand and use, based on scientific evidence, and takes the latest technology into consideration. All of the manufacturers, importers, service providers, wholesalers, and retailers that produce products or provide services in the European Union are eligible to apply for the EU Ecolabel.

The EU Ecolabel promotes the Circular Economy by encouraging manufacturers to produce less waste and greenhouse gasses (GHGs) during production, and businesses to distribute or sell durable, easy-to-repair, and recyclable products, and make it easier for consumers to choose high-quality, environmentally friendly, and healthy products.

The EU Ecolabel relies on third-party verification to confirm whether or not a product or service meets its standards, and each EU Member State designates a government or other authority that makes sure that the verification process is consistent, neutral, and reliable.

The International Organization for Standardization (ISO) is an independent, nongovernmental organization that develops standards to ensure the quality, safety, and efficiency of products, services, and systems. ISO 15270 provides guidance on the recovery and recycling of plastic waste; it establishes quality requirements that should be considered at all stages of the waste recovery process; and it provides recommendations to include in the standards for materials and tests, as well as for products' specifications.

The ISO has established a working group to update ISO 15270:2008 Plastics—*Guidelines for the Recovery and Recycling of Plastics Waste*, and it is hoped that this process will identify additional standards related to plastics' recycling, design for recycling, and uses for recycled plastics (Akenji et al. 2019).

There are industry-led initiatives on the Circular Economy in the Philippines, but these primarily target recycling or substituting plastics with other single-use products, rather than addressing the need to reduce consumption. Data analyzed by the Global Alliance for Incinerator Alternatives (GAIA) in the Philippines show that a third (34.65 percent) of all the residual waste in the country is produced by only 10 companies (GAIA 2019). The strong market demand for SUPs, and uncertainties about the prospects for businesses if they invest in technologies and materials to produce more sustainable alternatives, could be dampening their interest. This is especially likely with micro, small, and medium enterprises (MSMEs), which usually lack the capacity and resources needed to invest in new technologies and products.

Enforcement must be improved for the industry-specific collection/take-back requirements for the significant amounts of plastics reaching their end-use. Republic Act 11898 on mandatory EPR for large corporations, which was enacted in July 2022, specifies industry-specific collection and take-back provisions for plastic products and packaging that are reaching their end-use. Based on the principle, Polluters Must Pay, DENR Administrative Order (DAO) 2023-02, dated January 24, 2023—the IRR of RA 11898—contains crucial elements to strengthen operationalization of the EPR Law. These elements include registration procedures for the companies obligated to comply with EPR; provisions for an information database on SWM; and standards, rules, and guidelines for EPR reporting, verification, and auditing.[23]

Under the EPR Law, the Philippines should consider focusing from the outset on key rigid plastic types which has high value for recycling such as as PET, PP and PE; and flexibles recovery for co-processing. The progressive inclusion of other plastic types would then follow when the main targets for recovery and efficiency have been achieved. For the EPR Law to be effective, it should be supported by improving the LGUs' solid waste management systems, which primarily carry out the collection and recovery of recyclables. Good EPR implementation examples for the Philippines to consider are those of the Republic of Korea and the Ellen MacArthur Foundation (see Box 4.2).

23 As of November 2022.

BOX 4.2.
EXTENDED PRODUCER RESPONSIBILITY EXAMPLES

Korea's EPR system: The Republic of Korea enacted its EPR system for packaging in 2003, following significant economic growth that began in the 1980s, and resulted in far greater waste generation and waste management challenges. To minimize the use of resources required to meet Korea's high demand for energy, the government adopted resource recovery from landfills, and maximized reuse and recycling. The Korean Ministry of Environment developed and implemented laws related to waste management that apply the 3Rs (*Reduce, Reuse, and Recycle*). Based on this strong legal foundation, the Korean government introduced several recycling policies, including EPR, and these have contributed to substantially reducing the volume of waste in Korea.

In addition to setting up the EPR system, several preventive and economic measures were taken in Korea that include the Volume-Based Waste Fee (VBWF) system, the Waste Charge System (WCS), and the Voluntary Agreement (VA) system. Under the VBWF system, waste dischargers pay the costs for managing their waste, including collection and treatment. The WCS requires manufacturers to consider the environmental impact of their products at the production stage, and they must pay non-refundable fees on "products and containers which are difficult to collect, treat, or recycle or likely to render waste management generally difficult." Under the VA system, companies that are not legally required to do so, voluntarily reduce their plastic waste, using the most feasible approach for their business.

The EPR system in Korea has achieved the following results:

- In 2018, 1.45 million tons of recyclable plastic waste were collected from households. Of this, 30.8 percent were fed into recycling processes. Of the remainder, 22.7 percent were used for energy recovery through conversion into solid refuse fuel (SRF) for cement kilns; 40.9 percent were incinerated; and 4.6 percent were deposited in landfills.
- The proportion of plastic waste in landfills and incinerated decreased significantly between 2003 and 2019. Between 2003 and 2006, 20 to 25 percent of plastic waste, including plastic packaging, was landfilled. By 2019, only 5 percent of plastic waste was landfilled. The incineration of plastic waste, including plastic packaging, decreased from 48 percent in 2003 to 25 percent in 2019. Due to the reduction of incinerated and landfilled plastic waste, including plastic packaging, between 2003 and 2019, Korea's greenhouse gas (GHG) emissions declined by about 3 million tons of carbon dioxide (CO_2) equivalent.
- The amount of plastic packaging recycled as a result of EPR increased from about 172,000 tons in 2003 to about 875,000 tons in 2019.

Since the inception of Korea's EPR scheme in 2003, the recycling of plastic packing has increased by an estimated 74 percent.

Plastics Pacts: The Ellen MacArthur Foundation was established in 2010 to create a worldwide network of national and regional initiatives to support developing a Circular Economy for plastics. The network includes national Plastics Pacts in Canada, Chile, France, the Netherlands, Poland, Portugal, South Africa, the United Kingdom, and the United States. Regional pacts include the European Plastics Pact and the Australia, New Zealand, and Pacific Islands (ANZPAC) Plastics Pact (Ellen MacArthur Foundation n.d.).

Each initiative has an ambitious set of local plastic eco-design targets, which include: (i) elimination of unnecessary and problematic plastic packaging through redesign and innovation; (ii) transition from single-use to reuse; (iii) ensuring that all plastic packaging is reusable, recyclable, or compostable; (iv) increasing the reuse, collection, and recycling, or composting of plastic packaging; and (v) increasing the recycled content in plastic packaging.

In the United Kingdom, the target is for 100 percent of plastic packaging to be reusable, recyclable, or compostable by 2025. In South Africa, the Plastics Pact commits its members to the following 2025 targets:

- Taking action on problematic or unnecessary plastic packaging through redesign, innovation, or alternative (reuse) delivery models;
- Ensuring that 100 percent of plastic packaging is reusable, recyclable, or compostable;
- Effectively recycling 70 percent of plastic packaging; and
- Maintaining a 30 percent average for recycled content across all types of plastic packaging.

The low collection rate achieved by the LGUs and barangays can be partially attributed to their limited institutional capacity to implement the requirements of RA 9003, and perform the waste management-related duties that are identified in the act. Establishing a SWM Board in each community is critical for providing policy direction, formulating SWM plans, and sustainably carrying out SWM.

Most LGUs still need to establish a local Environment and Natural Resources Office (ENRO) since this is an optional provision of RA7160 or the Local Government Code resulting in challenges such as addressing the Personnel Services Cap. The lack of, or the understaffing of a local ENRO is one of the main reasons why an LGU provides inadequate SWM services, and this also hinders the development and implementation of an LGU's SWM Plan. The term of members on most LGU SWM Boards coincides with their political term, which results in continual changes in board membership and this, in turn, affects the continuity of the board's policies, and their effective implementation.

As informal workers are not employed by the LGUs, their revenues depend on the volume of good quality recyclables that they recover from collection points, collection vehicles, and at disposal sites.

Some LGUs register and regulate junk shops through local ordinances as they consider junk shops to be material recovery facilities for recyclables, and some LGUs have even established a Memorandum of Agreement with a junk shop operators' association. However, the LGUs need more guidance regarding the opportunities and benefits of officially incorporating informal workers into their waste services.

Box 4.3 provides an example from Colombia on best practices for integrating informal workers into the SWM system, and one from Vancouver, in Canada, on scaling up its Plastic Bank in 2013 to include members from developing countries, including the Philippines.

BOX 4.3.
EXAMPLES OF INTERNATIONAL BEST PRACTICES FOR INTEGRATING INFORMAL WORKERS INTO SOLID WASTE MANAGEMENT

Colombia: In 2013, the Association of Waste Pickers of Bogotá (ARB) received a favorable ruling from the Constitutional Court of Colombia that led to their inclusion, recognition, and remuneration for collecting, transporting, and recycling waste.

The Columbian government then modified its recycling policies to be more inclusive by no longer requiring the legalization, formalization, and elimination of informal recycling. Bogotá was one of the first cities in Colombia to integrate waste pickers into the SWM system, and pay them for their services. Since then, this approach has been replicated in other cities in Columbia, and by May 2019, more than 25 cities had recognized at least one waste pickers' organization, and was paying for their recycling services. The integration of waste pickers into municipal SWM systems has had a significant impact in Colombia. For example, the quantity of waste recovered and recycled increased dramatically from 97,905 tons in 2016 to 536,092 tons in 2017.

A system of diversion credits compensates recyclers for the environmental benefits and public services they provide; however, only registered recyclers are entitled to this payment. Under this system, not all junk shops are required to report their quantity of recyclables. Colombian collectors must join an organization, a union, or a cooperative by a specific date in order to qualify for the service payments authorized under the Decree (GIZ 2018).

Plastic Bank: The Plastic Bank was started in 2013 in Vancouver, Canada, and it has become a worldwide initiative to clean up the oceans by paying people to collect plastic waste. This, in turn, is helping to improve people's livelihoods. In some of the world's poorest countries, the Plastic Bank encourages people, and especially women, to collect and deliver plastic waste to recyclers in their local community. In return for collecting and delivering plastics, these waste pickers receive goods, cash, blockchain-secured digital tokens, or other rewards, such as schooling for their children, and even food. This trading system improves communities' recognition of the value of plastic waste, and it makes plastic too valuable to throw away. The Plastic Bank, which enables the processing of collected plastic so that the materials can be reintroduced into the supply chain, operates in Haiti, the Philippines, Indonesia, and Brazil (Plastic Bank 2022).

In the Philippines, through efforts to integrate informal workers into the SWM system, the Philippine Alliance for Recycling and Materials Sustainability (PARMS), which is a consortium of businesses operating at all stages of the plastic value chain, is developing a plan to award credits to recyclers and producers of plastic products and packaging.

4.2 Analytical and Infrastructure Barriers

The need for adequate facilities for waste collection and treatment is substantial in metro areas in the Philippines, as well as in remote and underdeveloped areas. In the 7,600 plus islands of the Philippines, waste collection and treatment varies greatly across urban, rural, and remote areas. The poor collection coverage in much of the country can be attributed to factors that include the lack of funds to procure and maintain waste collection equipment; the lack of vehicles or the wrong type and size of vehicles; the inability of collectors to access remote areas; and inefficient collection schedules and methods. As the availability of funding is a limiting factor in procuring equipment for waste management, Green Public Procurement,[24] or a public-private partnership could finance improving waste collection (see Section 4.3). For example, due to their limited capacity, the barangays in Metro Manila contract out most of their waste collection to private haulers.

The Philippines needs more recycling infrastructure. Little recycling occurs on the small, less populated islands, and in the Philippines' uplands. In these areas, lack of scale, poor management systems, and available technologies are a challenge for recycling companies. Recycling companies rely on informal and fragmented waste supply networks that only operate on cash terms, and they have no long-term, formal contracts. As many recyclers operate with low-efficiency equipment, achieving profitability is incredibly challenging (World Bank 2021b).

The availability of financing for the technologies used by recyclers needs to improve. Although the recycling industry is eligible for the general public investment incentives offered to all businesses by the Philippine Board of Investments (BOI), in mid-2023, the BOI, which is an agency of the Department of Trade and Industry, had no investment incentives that specifically target the recycling industry. Consequently, more government support is needed to finance improving the technology that recyclers use. In interviews with recyclers' associations, which the World Bank conducted in 2021, some participants stated that the available incentives are more suitable for large multinational companies. Respondents also stated that the typical SME recycler would likely find it too challenging to meet the eligibility criteria for financing, and to fulfill the BOI's administrative requirements (World Bank 2021b).

Proper waste disposal is severely limited in the Philippines due to the small number of sanitary landfills, and their lack of remaining capacity. This has resulted in a large number of unregulated dumpsites, the dumping of waste on vacant land, and the widespread burning of waste, which produces toxic smoke. The differences in disposal capacity across the Philippines highlights the need for new approaches in dealing with plastic waste. Regions with limited capacity for landfills, such as small islands and upland areas, should consider prioritizing policies that reduce the generation of plastic waste. This approach is crucial, too, across the Philippines to reduce pressure on the existing landfills. The slow adoption of the LGUs' SWM plans also needs to be addressed to fast-track the clustering and regionalization of sanitary landfills, which would allow multiple LGUs to use the same facility.

LGU and regional solid waste management offices have limited capacity. The LGUs' adoption of new technologies for SWM is limited by their lack of knowledge and skills on how to operate and maintain their waste infrastructure. Thus, developing the capacity of LGU staff is crucial to enable them to adopt new technologies, and the private sector to participate in addressing the gaps in SWM knowledge and skills. Increasing the involvement of the private sector in waste management also means that the LGUs will need new skills to effectively supervise and regulate private service providers.

4.3 Financial and Funding Barriers

The LGUs need more effective cost-recovery mechanisms for waste management. The cost-recovery tools to cover waste management expenses, which are mandated by RA 9003, need to be better implemented so that they finance increasing the low waste collection rate and coverage, and especially in remote areas. RA 9003 requires the LGUs to establish material recovery facilities (MRFs); however, many barangays lack the financing to build and operate these facilities. Poor implementation of segragation-at-source mandates and the limited number of MRFs and their lack of efficiency limits the potential for recovering recyclables. This also leads the LGUs to rely heavily on the informal sector to carry out recycling.

Data is not available on the number of LGUs that charge residential SWM fees, but it appears that few do. In the LGUs that do charge fees, not all households pay their SWM fees. The reasons why an LGU may not charge residential SWM fees include: (i) The imposition of residential SWM fees is a local government matter. While national laws provide a framework for SWM, the local government decides how to implement the SWM regulations based on its own interpretation, circumstances, and priorities; (ii)

24 Green Public Procurement is the term applied when a government uses its purchasing power to choose goods, services, and public works that have a positive environmental impact, and contribute toward the country's sustainability goals.

Some LGUs lack the financial skills to manage residential fee collection and accounting; (iii) Some LGUs delay implementing residential SWM fees until they have the infrastructure necessary to provide a proper level of service; (iv) Funds for SWM are available from other sources such as the National Tax Allotment, an international development project that supports SWM, and/or property taxes and other local fees; (v) Local social and political factors influence whether or not to impose residential SWM fees. For example, the LGUs may be concerned that households cannot afford to pay the fees, or that charging fees will negatively influence voters in the next local election; (vi) No data are available to use in appropriately structuring residential SWM fees—for example, data on the amount of waste, the type of waste, and residents' willingness to pay the fees; and (vii) Imposing residential SWM fees is situational and depends on the classification of the LGU, as well local leaders' political will to pass the an ordinance requiring households to pay waste collection fees.

A sustainable cost-recovery mechanism, which leads to certainty about the repayment of financing, could incentivize the private sector's participation in SWM (See Box 4.4 on Singapore's example of implementing public-private partnerships for solid waste management). Conversely, cross-subsidization and lack of earmarking have adverse effects on SWM financing because the funds collected from the SWM fees could be spent on other local needs such as education and health care. Although the LGC allows the LGUs to adjust the assorted fees they charge every five years, most LGUs have not taken advantage of this. In summary, the collection of SWM fees from the residential sector appears to be situational, and most LGUs' SWM costs are paid by the LGUs, themselves, and included in their yearly budget for the Annual General Appropriation (Kariuki and Ancheta 2008). Furthermore, although prescribed by RA 9003, most barangays have not established a Local SWM Fund.

Collected and segregated waste must be transported to recyclers, most of which are in Metro Manila, so transporting waste from other areas of the country is expensive. On the Philippines' bigger islands, the collected waste is transported by boat to Cebu Island. In the case of small islands, the focus is on waste collection, recovery, and temporary storage of recyclables until there is enough waste to economically transport it for recycling, or proper disposal in a sanitary landfill.

To achieve high-quality output, there must be more investment in recycling technologies for plastics. As noted above, most of the businesses in the recycling sector are SMEs, and these require funding to improve their processes so that they can carry out high-quality work. As noted above, some significant challenges in the recycling sector mean that private investors lack confidence in investing in the recycling industry. These challenges include data and market information barriers (Section 4.4). In addition, more and better-quality secondary raw materials are needed. The commercial recycling technologies that produce high-value recycled plastic such as food-grade recycled polyethylene terephthalate (rPET), recycled polyethylene (rPE), and recycled polypropylene (rPP), require consistent tonnage, but this is not available due to reliance on informal collectors, the high cost of transporting recyclables, and competition within the informal recycling industry (World Bank 2021b). Box 4.4 discusses how Singapore has managed to attract private investment in waste collection.

BOX 4.4.
SINGAPORE'S EXAMPLE OF PUBLIC-PRIVATE PARTNERSHIPS FOR WASTE COLLECTION

Launched in April 2001, the National Recycling Programme in Singapore uses public-private partnerships, it encourages household recycling, and it promotes the 3Rs (*Reduce, Reuse, Recycle*). Public waste collectors (PWCs) are recruited and licensed by the National Environment Agency through open tenders that require prequalification, and the PWCs are financed with the fees that households pay for their waste collection. For the duration of their contract, which is usually for seven or eight years, the PWCs provide recycling bins and collection services to household groups in Housing Development Board estates, as well as to individual households. However, industrial and commercial establishments must have their waste collected by licensed collectors, and pay enough to cover the full cost (National Environment Agency 2022).

Individual households and those in housing estates deposit their mixed recyclables (paper, plastic, glass, and metals) in the blue bins provided by the PWCs. After these mixed recyclables are collected by truck, and sorted, they are sent on to recycling facilities for further processing.

The recyclables in housing estates are collected three times a week from the 660 liter (L) recycling bins, and once a week from the 1,800L/2,200L side-loader recycling bins. Recyclables and garden waste are collected, weekly, from individual households.

4.4 Data and Information Barriers

More data are needed on waste generation, collection, and treatment. The Philippines has no systematic way of collecting and presenting local, regional, or national aggregate data on waste generation, collection, treatment, and disposal. Moreover, the limited data that are available are not based on empirical evidence. This is due to the lack of an integrated information system for collecting data on the generators of waste. The NSWMC has assigned the National Ecology Center to collect waste-related data, but as of mid-2023, the database was not ready to operate. Moreover, waste generators and companies collecting, sorting, and recycling waste do not report on the quantities and types of waste they handle. The lack of data on SWM is even worse in rural and remote areas. The SWM data that are available at the barangay, LGU, and agency levels are also limited. This lack of data negatively impacts the ability of the LGUs to make well-informed decisions, policies, and plans for the development of infrastructure and the purchase of equipment, as well as accurately calculate SWM fees. Box 4.5 presents examples of best practice waste management information systems in South Africa and Austria.

BOX 4.5.
EXAMPLES OF BEST PRACTICE WASTE MANAGEMENT INFORMATION SYSTEMS

South Africa: One of the waste management challenges faced by South Africa has been the need for more information on the sector. To address this, the Department of Environmental Affairs and Tourism developed the South African Waste Information System in 2005 (South African Waste Information Center n.d.). This system requires reporting data, monthly and annually, on the quantities of waste that are generated, recycled, and discharged. A phased approach to reporting has been adopted to assess the status of SWM. This system of progressively collecting and reporting data could be expanded when the private companies and designated government agencies have the capacity to take full ownership and responsibility for the system. The system could also include additional and more detailed data from stakeholders. The collected data are made public through annual reports that can be accessed online in various formats, including maps and statistics.

Austria: According to the requirements of the Austrian federal law on sustainable waste management (Waste Management Act 2002-AWG 2002), before they begin their activities, waste collectors and operators of waste treatment facilities must register on the Environment Data Management (EDM) portal of the Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation, and Technology. They must also report on the quantity of waste they receive or transfer. The EDM provides a network of internet applications and databases that support the complex procedures needed to enable the recording of documentation on registration, and on the reporting obligations in the environmental sector (BMK n.d.).

To apply to join the EDM system, a waste collector or the operator of a treatment facility must provide the following information: (i) name, (ii) mailing address, (iii) company registration number, (iv) industry sector code, and (v) a contact person's information. After the acceptance of its application, the business receives an identification number, and access to the register so that it can input the required waste management information, which includes: (i) addresses for the locations of its facilities, (ii) the treatment methods it uses, (iii) its types of facilities, (iv) its reporting units, and (v) contact information for its applicable company personnel.

The current reporting system employed by the NSWMC includes the number and location of sanitary landfills, material recycling facilities, and the dumpsites that have been closed down. However, the quantities of waste generated, collected, recycled, composted, and disposed of, are not reported. Basic annual reporting should include the:

- waste generated at the LGU level, which is based on an updated Waste Analysis and Characterization Study;
- location, capacity, inputs, outputs, and status of the MRFs and junk shops in each LGU;
- location, initially built capacity, remaining capacity, and daily inputs of the operating landfills in each LGU; and
- amount of waste collected per LGU.

The data collected and processed by the NSWMC could be made available to people through the agency's website. The NSWMC could also consider developing a simpler method for reporting data so that the LGUs are willing to comply with their data reporting requirements. This reporting on solid waste and plastic waste should include information on the waste's source, destination, method of collection and disposal, and the quantity diverted.

Through its Environmental Management Bureau, the DENR has completed improvements to the LGU SWM Self-compliance Monitoring and Auditing Report. An online system for this reporting is also being developed to cover all of the LGUs across the Philippines, and this will help to determine waste flows, including leakage, and the resulting GHG emissions.

More data are needed on buyers, sellers, recyclables, and the prices for recycled plastics. As of mid-2023, no systematic monitoring data were collected and available that indicate the number of recyclables that have been separated from the waste stream and sold to junk shops, consolidators, and recyclers (World Bank 2021b). In most LGUs, junk shops and, in some cases, even consolidators, are not registered/hold a permit, and therefore they do not report on the plastic waste quantities they collect (the LGUs in Metro Manila and other cities and municipalities are the exception to this). As noted previously, the availability of these data on waste management and recycling is critical for informing policy makers so that they can develop the appropriate targeted solutions, and also for increasing investors' trust so that they are willing to finance new recycling technologies. In addition, there should be more registration of junk shops, reporting on their waste, and verification of the quantities of waste they report as lack of this information is a significant obstacle in implementing the EPR Law.

More data are needed on the extent of littering and marine pollution. Some field studies have been conducted in the Philippines to gather reliable information on the types and quantities of plastic waste littered in the environment (World Bank 2021c, World Bank 2021d, and Yoshioka and Sasaki 2021), however, these data are only available for a few urban regions. The limited data from the few surveys do not identify socio-economic and other regional differences, and the data do not indicate where waste is produced and leaked, or the sectors or industries that are responsible for the waste. The collection of reliable data on the sources and pathways of the plastic waste that is discarded on land and leaks into waterways and the ocean needs improvement, as this lack of reliable data poses a significant barrier to informed decision-making, target setting, and monitoring.

More data are needed on the alternatives to SUPs that are appropriate for the Philippines. Comprehensive studies should be conducted in the Philippines to provide information on the alternatives to SUPs that are in use, or that could be considered for replacing the most polluting plastic. Life cycle assessments (LCAs) have been conducted for just a few alternatives to plastic, such as paper bags. LCAs for the socially acceptable alternatives such as those made from natural materials must be initiated, too, along with LCAs for potential alternatives to all of the primary plastic products that are targeted for phase-out in the Philippines.

Consumer awareness needs to improve about the negative impacts of plastic consumption. A *tingi* or "piece-meal" approach prevails in the Philippines, and drives the over-consumption of sachets and other SUPs (Ang and Sy-Changco 2007). Low-value and hard-to-recycle flexible plastic packaging comprises a large share of the plastic packaging entering the Philippine market. Although, most Filipinos are now aware of the need to reduce their consumption of SUPs (GAIA 2020), to phase out sachets and other SUPs, affordable alternatives must be available. Consumers' attitudes also need to change to drive their demand for products sold in bulk. Additionally, as required by RA 9003, financial sustainability needs to be achieved through the LGUs charging waste collection fees, and indirect charges in the form of time-bound and targeted subsidies.

5. THE PHILIPPINE PLASTIC WASTE MANAGEMENT ROADMAP

5.1 Roadmap – Rationale

According to various studies, the Philippines is one of the top three emitters of plastics that end up in the ocean (Ritchie and Roser 2018). Previous studies by the World Bank (see Section 1.2) have identified plastic waste pollution as one of the Philippines' most critical environmental issues. Plastic waste management is part of solid waste management, and the current inadequacy of the Philippines' SWM system negatively impacts its management of plastic waste. Thus, plastic waste pollution can only be improved through corresponding improvements in solid waste management.

As noted previously, the environmental threat of plastic pollution has been growing in the Philippines as a result of the combined effects of economic growth; people's increasing consumption; changing consumption patterns; poor enforcement of waste-related regulations; limited public awareness about the impact of plastics' mismanagement; and the lack of suitable alternatives to SUP products.[25]

With its emerging policy and institutional framework, the Philippines appears to be becoming well-equipped to address plastic waste pollution. With the acknowledgment of plastic waste pollution's contribution to GHG emissions, and to the exacerbation of climate hazards, the Philippines' Nationally Determined Contribution (NDC), which was submitted to the United Nations Framework Convention on Climate Change (UNFCCC) in 2021, cites promoting the Circular Economy as one of the measures to strengthen the Philippines' resilience and capacity to adapt to climate change.

As previously noted, Republic Act 9003 provides guidelines for SWM that include provisions for managing potentially recyclable materials, including plastics. With its focus on marine litter, including marine plastic, the National Plan of Action for the Prevention, Reduction, and Management of Marine Litter (NPOA-ML) also supplements RA 9003. The other important plastic and solid waste management measures in the Philippines are: the National Solid Waste Management Commission's Resolution 1428, which bans plastic straws and stirrers pending a phase-out plan as prescribed by law; the 2022 Extended Producer Responsibility Act, which makes the producers of plastic waste fully responsible, financially, for treating the waste from their products and packaging over their lifespan, and after disposal; and the Philippine Green Jobs Act of 2016 (RA 10771), which provides a policy framework for fostering low-carbon, resilient, and sustainable growth, as well as incentivizing enterprises to create green jobs. RA 10771 also promotes the creation of jobs that minimize or altogether avoid the generation of all forms of waste and pollution. At the local level, nearly 500 LGUs (about a third of all LGUs) have issued ordinances to either ban or regulate SUPs.

25 RA 9003 requires that alternatives to NEAPs be available for consumers at no more than 10 percent above the cost of the disposable product (Section 29, RA 9003).

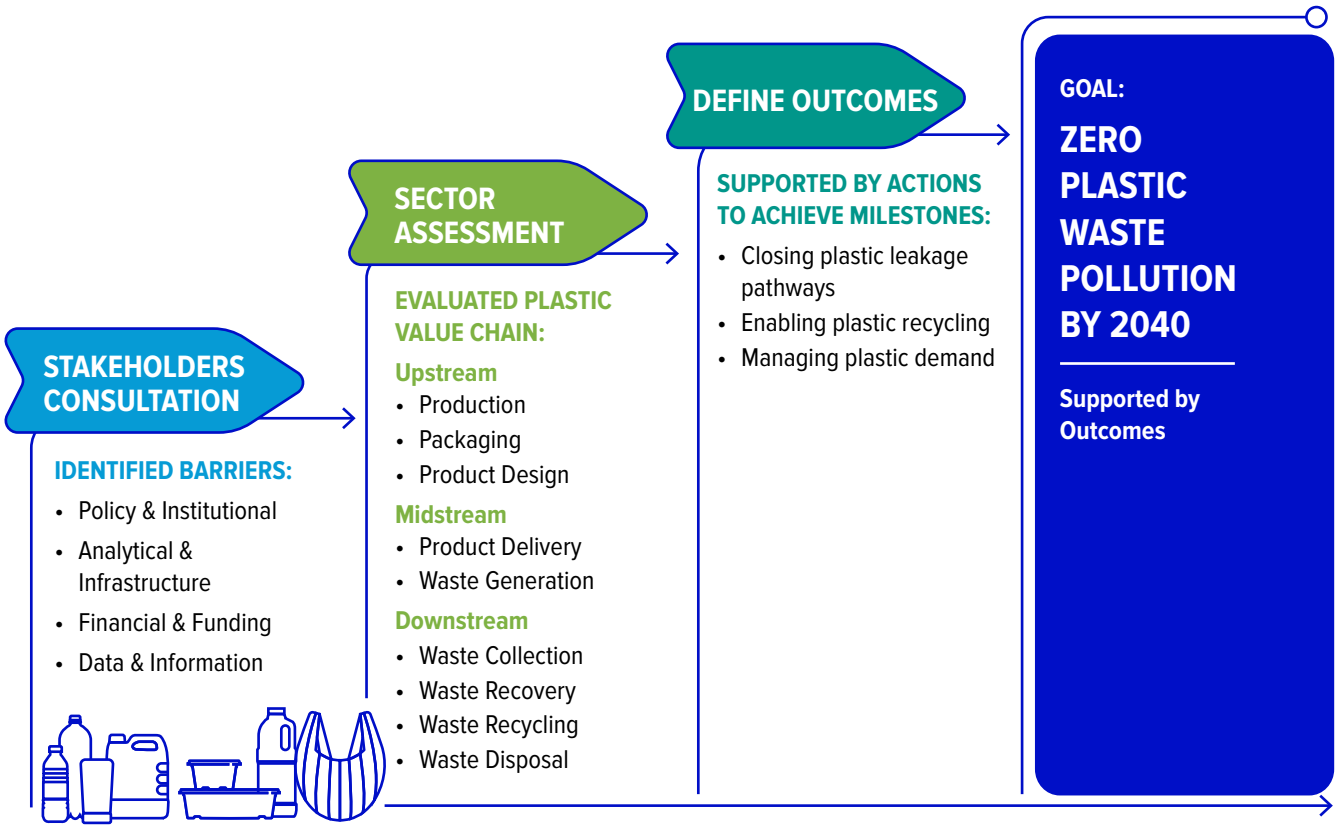
Although Philippine laws and regulations on SWM provide national government agencies and the LGUs with a clear legal, technical, and financial mandate on solid waste and plastic waste management, plastic waste continues to be a substantial threat to the environment and people of the Philippines.

The Roadmap presented in this section combines the government's current policies, strategies, and programs on SWM, which were discussed in previous sections of this report, with clear directions that the key plastic waste management stakeholders can follow in reducing non-recyclable SUPs.

This Roadmap is grounded in the following principles:

- **Inclusion of All Relevant Groups.** The Roadmap identifies the various socio-economic impacts that the elimination of SUPs could trigger, and which could negatively impact stakeholders at all levels of society. These stakeholders comprise consumers, vulnerable communities, the informal waste sector, women and youth, and the private sector, and especially small and medium enterprises.
- **Participation of Stakeholders.** The Roadmap supports a participatory approach. Preparation of the Roadmap included consultations with relevant stakeholders across the plastic supply chain (see Section 5.5 and Annex D), and these consultations are ongoing as the Roadmap is implemented.
- **Polluters Pay.** The Roadmap is designed to be financially sustainable. By leveraging the financial mechanisms that various laws support, including the principle in the EPR Law that Polluters Pay, manufacturers and other waste generators are made accountable for the cost of managing the waste generated by their products.
- **Adaptive Approach.** The Roadmap is designed to operate within the current legal and institutional framework, but it is flexible so that if the Roadmap's monitoring and evaluation (M&E) assessments identify the need for change, the Roadmap can be revised.
- **Science-based and Data-driven.** The Roadmap uses evidence-based practices that are technically sound, have verifiable methodologies for data collection, and it offers a selection of viable options at different stages of its implementation.

FIGURE 5.1. KEY STEPS IN FORMULATING THE PHILIPPINE PLASTIC WASTE MANAGEMENT ROADMAP



Source: World Bank

The Roadmap's development process is summarized in Figure 5.1.

The Roadmap uses a phased, evidence-based, and holistic approach to address SUP pollution along the plastic value chain, from the production of SUPs, through their consumption, to their collection, and recycling or disposal. The Roadmap also proposes Actions to close the gaps in plastic waste management in the Philippines, and progressively decrease plastic pollution. Thus, the Roadmap is intended to help the country move toward a more Circular Economy, while providing better plastic waste management. The Roadmap's Actions have been carefully crafted, prioritized, and timed based on consideration of stakeholders' current capacities, but the Actions also anticipate the improvement of stakeholders' capacities over the Roadmap's three six-year terms. This strategic approach will be based on assessments of policies, their implementation, and consultations with stakeholders.

Given the evident problem of plastic waste leakage in the Philippines, as well as the long-standing, unaddressed weaknesses in the existing waste collection, segregation, and recycling systems, the Roadmap places significant emphasis on tackling downstream problems within the plastic value chain. At the outset, the Roadmap prioritizes urban areas because more than half of the country's waste is generated in urban areas, and with their better SWM systems, urban areas will be better able to implement the Roadmap's Actions.

As noted above, it is expected that more complex strategies, which require advanced technical skills, capacity, and regulatory systems will be implemented at later stages in the Roadmap's timeline. This sequencing of increasingly complex outcomes over the stages of the Roadmap is expected to progressively reduce waste leakage, gradually increase recycling rates, and continuously improve the design of plastic products. Additionally, the Roadmap's Actions are attuned to the realities of waste management in the country. For example, the developers of the Roadmap recognize the indispensable role played by the informal waste sector in separating, collecting, and recycling plastic waste; and, thus, the Roadmap includes the intention to organize and support the informal sector. The Roadmap also aims to enhance the institutional capacity of the LGUs to manage waste collection and treatment.

In the text that follows, the Roadmap's Actions, Milestones, Outcomes, and ultimate Goal are discussed in detail.

5.2 Roadmap – Goal and Outcomes

The Roadmap provides a systematic approach for addressing the plastic waste problem in the Philippines, and it is intended to achieve the progressive realization of its major SWM Milestones, the timely passage and implementation of relevant legislation, and the reduction of non-recyclable SUPs. Thus, the Roadmap is designed to achieve the goal of *Zero Plastic Waste Pollution by 2040*.

The Roadmap is based on a framework that links the barriers discussed in Section 4, which were identified in stakeholder consultations (see Section 5.5 and Annex D), and in the sector assessment (see Section 2). As noted in Section 1, these barriers along the plastic value chain are: (i) Upstream: Production, Packaging, and Product Design; (ii) Midstream: Product Delivery and Plastic Waste Generation; and (iii) Downstream: Plastic Waste Collection, Recovery, Recycling, and Disposal.

These barriers in plastic waste management contribute to the large production of SUPs and their leakage into the

TABLE 5.1. SUMMARY OF THE BARRIERS AND GAPS IN PLASTIC WASTE MANAGEMENT

Category	Barriers and Gaps in Plastic Waste Management
Policy and Institutional	• Policies are needed that promote reducing non-recyclable plastic consumption and adopting eco-designed alternatives. • Enforcement must be improved for the industry-specific collection/take-back requirements for the significant amounts of plastics reaching their end-use. • The LGUs and barangays have limited institutional capacity to carry out waste collection and management. • Due to the LGUs' challenges in collecting and segregating all of their waste, the informal sector plays a significant role in recovering valuable recyclables.
Analytical and Infrastructure	• The need for strict implementation of segragation-at-source complemented by adequate facilities for segragated waste collection and treatment is substantial in metro areas in the Philippines, as well as in remote and underdeveloped areas. • The Philippines needs more recycling infrastructure, and more than just a few companies that are authorized to carry out recycling. • The availability of financing for the technologies used by recyclers needs to improve. • Proper waste disposal is severely limited in the Philippines due to the small number of sanitary landfills, and their lack of remaining capacity. • LGU and regional solid waste management offices have limited capacity.
Financial and Funding	• The LGUs need more effective cost-recovery mechanisms for waste management. • To achieve high-quality output, there must be more investment in recycling technologies for plastics.

Category	Barriers and Gaps in Plastic Waste Management
Data and Information	• More data are needed on waste generation, collection, and treatment. • More data are needed on buyers, sellers, recyclables, and the prices of recycled plastics. • More data are needed on the extent of littering and marine pollution. • More data are needed on the alternatives to SUPs that are appropriate for the Philippines. • Consumer awareness needs to improve about the negative impacts of plastic consumption.

environment, and especially into the marine environment. These barriers, which were discussed in detail in Section 4, are summarized in Table 5.1.

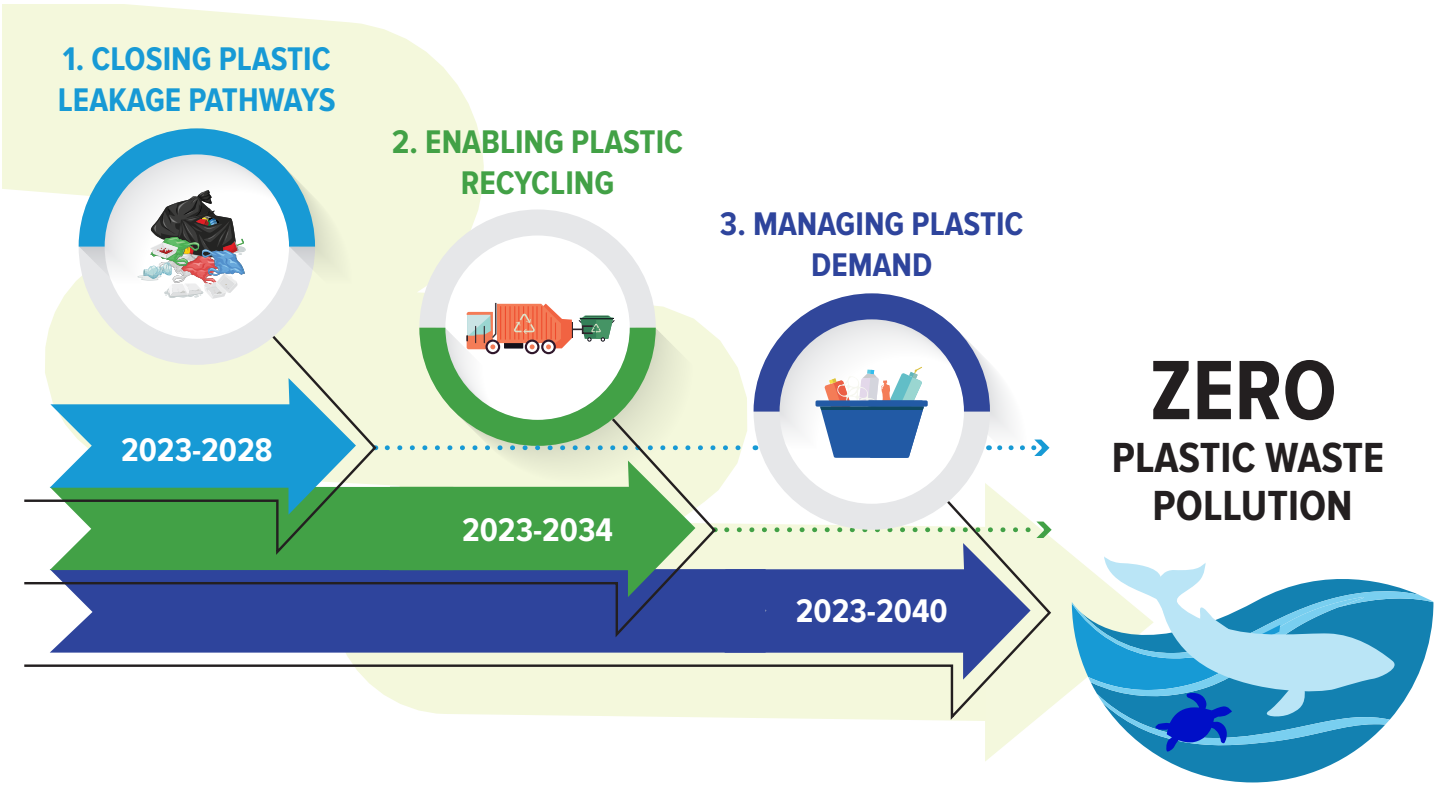
Based on the Roadmap's sector assessment and gap analysis, and on agreement with the stakeholders consulted, the Roadmap was designed with three strategic pathways of overlapping and time-bound target Outcomes (see Figure 5.2). These are based on the three six-year, medium-term planning cycles of the Philippines' government, and each cycle has defined Actions and Milestones. The Roadmap is designed to suit the current capacity and needs of the LGUs, but to achieve the goal of *Zero Plastic Waste Pollution by 2040*, the Roadmap provides substantial capacity-building Actions to scale up the knowledge and skills of the LGUs, as well as the national agencies involved in implementing the Roadmap.

Each Outcome presented in Figure 5.2 is monitored and measured against the achievement of its specific Milestones, which are shown in Figure 5.3. As noted above, to attain the goal of *Zero Plastic Waste Pollution by 2040*, the Roadmap's Actions are designed to achieve the Milestones and their respective Outcomes over three six-year terms—the first of which is from 2023 to 2028. The implementing Actions that address all of the plastic life cycle stages sequenced in the three medium-term development plans will require well-coordinated interventions.

The Milestones that are intended to achieve the short-term outcome (Outcome 1)—*Plastic Leakage Pathways Closed by 2028*—comprise:

- **M1.1.** Non-recyclable SUPs are Reduced
- **M1.2.** Plastic Recovery from Existing Facilities is Increased
- **M1.3.** Complementary SWM Legislation is Enacted

FIGURE 5.2. THE PHILIPPINE PLASTIC WASTE MANAGEMENT ROADMAP AND ITS OUTCOMES



Source: World Bank

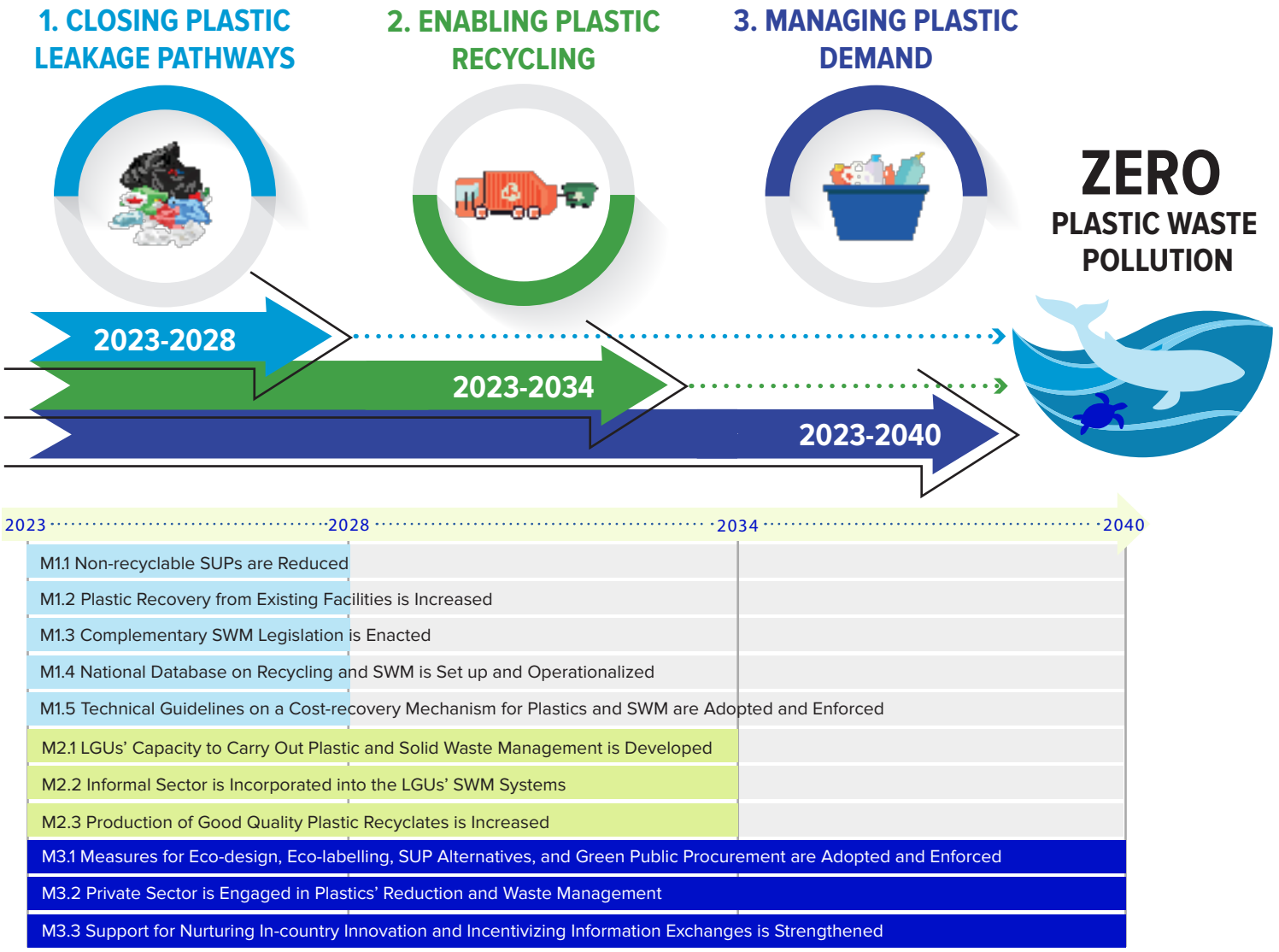
- **M1.4.** National Database on Recycling and SWM is Set Up and Operationalized
- **M1.5.** Technical Guidelines on a Cost-recovery Mechanism for Plastics and SWM are Adopted and Enforced

The Milestones that are intended to achieve the medium-term outcome (Outcome 2)—*Plastic Recycling Enabled by 2034*—comprise:

- **M2.1.** LGUs' Capacity to Carry Out Plastic and Solid Waste Management is Developed
- **M2.2.** Informal Sector is Integrated into the LGUs' SWM Systems
- **M2.3.** Production of Good Quality Plastic Recyclates is Increased

The Milestones that are intended to achieve the third and longer-term outcome (Outcome 3)—*Demand for Plastics Managed and Products Designed for Circularity by 2040*—comprise:

FIGURE 5.3. OUTCOMES AND MILESTONES OF THE PHILIPPINE PLASTIC WASTE MANAGEMENT ROADMAP



Source: World Bank

The Roadmap's Actions, which prioritize urban areas, are intended to close the gaps in plastic waste management in the Philippines, decrease plastic pollution, and help the country to move toward a circular plastics' economy by progressively improving stakeholders' capacities over three six-year terms.

- **M3.1.** Measures for Eco-design, Eco-labeling, SUP Alternatives, and Green Public Procurement that Promote Plastics' Circularity are Adopted and Enforced
- **M3.2.** Private Sector is Engaged in Plastic Reduction and Waste Management
- **M3.3.** Support for Nurturing In-country Innovation and Incentivizing Regional Information Exchanges is Strengthened

5.3 Roadmap – Actions

As previously noted, the Roadmap is designed to lead the Philippines toward sustainable systems for plastic production, consumption, collection, recycling, and disposal. As such, the Roadmap's Actions, which prioritize urban areas, are intended to close the gaps in plastic waste management in the Philippines, decrease plastic pollution, and help the country to move toward a circular plastics' economy by progressively improving stakeholders' capacities over three six-year terms. This strategic approach, which addresses the long-standing weaknesses in the LGUs' waste collection, segregation, and recycling systems, emphasizes tackling the downstream problems within the plastic value chain. As training and capacity development improves the LGUs' solid waste and plastic waste management skills, the Roadmap will also implement more complex strategies that require advanced technical skills, capacity, and regulatory systems. This sequencing of increasingly complex outcomes over the stages of the Roadmap is expected to progressively reduce plastic waste leakage, gradually increase recycling rates, and continuously improve the design of plastic products.

All of the interrelated Actions start in 2023, and they are expected to continue beyond their time-bound Milestones so that they carry on their efforts to achieve and sustain the Roadmap's goal of *Zero Plastic Waste Pollution by 2040*. Thus, after the Milestones for short-term Outcome 1—*Plastic Leakage Pathways Closed* have been achieved in 2028, its Actions are expected to continue. Similarly, for mid-term Outcome 2—*Plastic Recycling Enabled*, the implementation of its Actions should continue after its Milestones have been achieved in 2034. For long-term Outcome 3—*Demand for Plastics Managed and Products Designed for Circularity by 2040*—its Actions, which start at various times, and end in 2040, are based on the required prerequisites. The synergy achieved through the Roadmap's interlinked Actions is expected to result in significant improvements in plastic waste management, and to help realize the Roadmap's 2040 goal in a sustainable manner.

Short-term Outcome 1 (Year 2028) focuses on initiating the reduction of non-recyclable SUPs, and it is supported by the legislation that was proposed in the 18th Congress of the Philippines (2019–2022). This Outcome requires improving the performance of the MRFs to maximize their recovery of plastic waste before any additional investments are made in the MRFs. Improvements in plastic waste collection, recovery, recycling, and disposal should pave the way for an effective transition to medium-term Outcome 2 (Year 2034), which would create an enabling environment for plastic recycling in the Philippines. Long-term Outcome 3 (Year 2040)—*Demand for Plastics Managed and Products Designed for Circularity*—relies on achieving the earlier Milestones, which are intended to optimize waste management and plastic recycling (see Section 5.2 and Figure 5.3).

The Roadmap is expected to:

- drive significant reduction in non-recyclable plastic consumption and increase plastics' recovery through recycling and treatment;
- ensure the proper collection and recycling of SUPs;
- facilitate the implementation of extended producer responsibility schemes for plastic waste management;
- develop strategies for the identification and mainstreaming of reusable and recyclable alternatives to SUPs;
- improve peoples' behavior by increasing their awareness about the negative impacts of improper plastic waste disposal, and about best practices in plastic waste and SWM; and
- provide incentive mechanisms for fiscal and non-fiscal rewards to achieve the goal of *Zero Plastic Waste Pollution by 2040*.

Photo: Shutterstock/NavyBank

Short-term Actions and Milestones: Outcome 1—Closing Plastic Leakage Pathways by 2028

The short-term Actions presented in Figure 5.4 are expected to deliver Outcome 1—*Closing Plastic Leakage Pathways by 2028* through improving waste collection and recovery. These Actions support the achievement of the following five Milestones:

(i) M1.1. Non-recyclable SUPs where viable alternatives are identified are Phased Out:

- A1.1.1. Strengthen the regulatory framework to phase out non-recyclable SUPs though enforcing existing and new regulations on SUPs, plastics, and SWM;
- A1.1.2. Enforce the mandate of the EPR Law;
- A1.1.3. Increase the waste management capacity of selected priority sectors such as tourism; and,
- A1.1.4 Develop understanding of the distributional impacts of SWM and plastic policies, laws, and regulations, and how to minimize negative impacts.

(ii) M1.2. Plastic Recovery from Existing Facilities is Increased:

- A1.2.1. Audit LGUs' waste collection systems to identify facilities that could be the focus for short- and medium-term actions for increasing recovery;
- A1.2.2. Conduct an audit to develop an inventory of the existing MRFs, recycling facilities, and sanitary landfill sites;
- A1.2.3. Improve plastic and solid waste collection, including procuring waste collection vehicles;
- A1.2.4. Train SWM facility staff on O&M to improve their performance in recovering or recycling plastic waste; and,
- A1.2.5. Conduct feasibility studies to plan investments for designing and constructing additional MRFs, recycling facilities, and regional SLFs.

(iii) M1.3. Complementary SWM Legislation is Enacted:

- A1.3.1. Enact the laws that support the reduction of non-recyclable SUPs; and,
- A1.3.2. Amend Section VIII of RA 9003's IRR in the NSWM Framework to raise awareness about plastic waste, its impact, and sustainable alternatives.

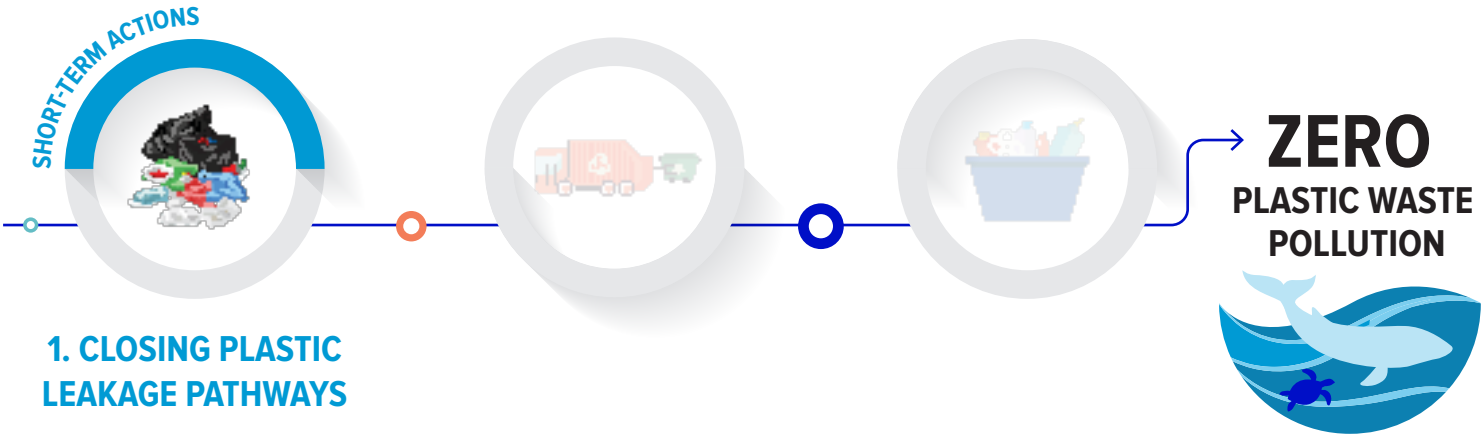
(iv) M1.4. National Database on Recycling and SWM is Set up and Operationalized:

- A1.4.1. Design a database on plastic recovery and recycling; and,
- A1.4.2. Publish data on waste collection, recovered recyclables, processed biodegradables, disposed of waste, and recycled plastic.

(v) M1.5. Technical Guidelines on a Cost-recovery Mechanism for Plastics and SWM are Adopted and Enforced:

- A1.5.1. Survey LGUs and the private sector haulers or service providers regarding the waste collection fees they charge businesses; and,
- A1.5.2. Prepare technical guidelines on cost-recovery mechanisms for plastic waste management.

FIGURE 5.4. SHORT-TERM ACTIONS (2023–2028, AND BEYOND) – THE PHILIPPINE PLASTIC WASTE MANAGEMENT ROADMAP



1. CLOSING PLASTIC LEAKAGE PATHWAYS

2023 ····· 2028 ····· 2034 ····· 2040

M1.1 SUPs are Phased Out

A1.1.1. Strengthen the regulatory framework to phase out non-recyclable SUPs where viable alternatives exist by enforcing existing and new regulations on SUPs, plastics, and SWM;
A1.1.2. Enforce the mandates of the EPR Law;
A1.1.3. Increase the waste management capacity of selected priority sectors such as tourism; and,
A1.1.4 Develop understanding of the distributional impacts of SWM and plastic policies, laws, and regulations, and how to minimize

M1.2 Plastic Recovery from Existing Facilities is Increased

A1.2.1. Audit LGUs' waste collection systems to identify facilities that could be the focus for short- and medium-term actions for increasing recovery
A1.2.2. Conduct an audit to develop an inventory of the existing MRFs, recycling facilities, and sanitary landfill sites;
A1.2.3. Improve plastic and solid waste collection, including procuring waste collection vehicles;
A1.2.4. Train SWM facility staff on O&M to improve their performance in recycling plastic waste; and,
A1.2.5. Conduct feasibility studies to plan investments for designing/constructing additional MRFs, recycling facilities, and regional SLFs.

M1.3 Complementary SWM Legislation is Enacted

A1.3.1. Enact the laws that support the reduction of non-recyclable SUPs; and
A1.3.2. Amend Section VIII of RA 9003's IRR in the NSWM Framework to raise awareness about plastic waste, its impacts, and sustainable alternatives.

M1.4 National Database on Recycling and SWM is Set up and Operationalized

A1.4.1. Design a database on plastic recovery and recycling; and,
A1.4.2. Publish data on waste collection, recovered recyclables, processed biodegradables, disposed of waste, and recycled plastic.

M1.5 Technical Guidelines on a Cost-recovery Mechanism for Plastics and SWM are Adopted and Enforced

A1.5.1. Survey LGUs and the private sector regarding the waste collection fees they charge businesses; and,
A1.5.2. Prepare technical guidelines on cost-recovery mechanisms for plastic waste management.

Source: World Bank

The short-term Outcome (2023–2028) of *Closing Plastic Leakage Pathways* into the environment at the collection, recycling, and disposal stages of the LGUs' SWM systems requires the achievement of five Milestones: (i) Non-recyclable SUPs are Reduced (M1.1); (ii) Plastic Recovery from Existing Facilities is Increased (M1.2); (iii) Complementary SWM Legislation is Enacted (M1.3); (iv) National Database on Recycling and SWM is Set Up and Operationalized (M1.4); and (v) Technical Guidelines on a Cost-recovery Mechanism for Plastics and SWM are Adopted and Enforced (M1.5).

Kick-starting these short-term Actions should improve the confidence of stakeholders, including the leading national government SWM agencies and the LGUs, so that they are able to successfully implement the Roadmap, and establish the necessary foundation for future Actions. For the Roadmap to progress toward the goal of *Zero Plastic Waste Pollution by 2040*, successfully achieving these early Milestones is crucial.

Actions to achieve Milestone M1.1 (Non-recyclable SUPs are Reduced)

First, strengthening the regulatory framework to phase out SUPs through enforcing existing and new regulations on non-recyclable SUPs, plastics, and SWM (A1.1.1) is a prerequisite for initiating later Actions in the Roadmap. These regulations comprise (i) NSWMC Resolution 1428, which identifies plastic straws and stirrers as non-environmentally acceptable products (NEAPs); (ii) the various ordinances to regulate plastic waste that 489 LGUs have passed; and (iii) the EPR Law enacted in July 2022, and its IRR, which were completed in January 2023, and that require: producers taking responsibility for the environmentally sound management of their products from manufacturing to disposal; buy-back schemes based on the *Polluters Pay Principle* that require producers to set up collection points for their waste, and collaborate with recycling organizations, and public and private waste management providers; product designs (promoted under Outcome 3) that stress the importance of eco-design to address the negative environmental impact of plastics throughout their life cycle (A3.1.2); and the labeling of products and packaging with information on their recyclability, composition, and proper disposal methods (A3.1.3).

Thus, as noted above, the new EPR Law encourages producers to: adopt more sustainable practices, including the use of eco-friendly materials; improve product designs; set up collection points for plastic waste; clean up coastal areas and public roads; divert recovered plastic waste back into the plastic value chain; and establish new centralized MRFs, recycling facilities, and regional SLFs (A2.1.2). In addition, as part of implementing the new EPR Law, non-recyclable SUPs' reduction will be promoted to manufacturers by the LGUs and the NSWMC.

Pending the enactment of new regulations, enforcement of the existing regulations is expected to systematically contribute to reduction of hard-to-recycle plastic products. The EPR Law also serves as a fiscal instrument that supports SWM initiatives, including plastic waste management, as the law enables a mechanism for producers to finance establishing and operating collection, recycling, and disposal systems. Thus, the EPR Law establishes a financial mechanism that requires producers to cover the cost of managing the waste from their products over their products' lifespan and after disposal. Finally, the EPR Law aligns economic and financial incentives with critical environmental objectives to create a more sustainable Circular Economy.

The tourism sector should be one of the first ones to be targeted in reduction of non-recyclable SUPs (A1.1.3). Tourism businesses normally operate in small areas, which means that it should be relatively easy to make these businesses comply with government waste-related regulations. In general, tourists will comply with the environmental requirements of an island or facility, and if tourists fail to comply, the businesses serving them can be easily fined. Thus, strict implementation of non-recyclable SUPs' reduction by tourism businesses could be achievable. For example, a revision of the National Accommodation Standards could include indicators on reducing SUPs' consumption, and the Department of Tourism could prepare new guidelines and training materials for managing SUPs in the hotel industry.

The regulations discussed above will have positive as well as negative impacts on the producers of plastic products, the businesses that distribute these, and the communities that use them. It is crucial for government policy makers and agencies to understand the distributional impacts of the new regulations—that is, how do the SWM regulations impact different socio-economic groups, and what measures are needed to minimize the negative impacts on vulnerable groups (A1.1.4). Section 5.5 and Annex D identify and share some preliminary understanding about the distributional impacts of implementing the Roadmap on various stakeholders.

Actions to achieve Milestone M1.2 (Plastic Recovery from Existing Facilities is Increased)

The second set of Actions starts with a comprehensive audit of the LGUs' waste collection systems to identify facilities that could be the focus for short- and medium-term actions for increasing recovery (A1.2.1). This should be supplemented by the development of an inventory of existing MRFs, recycling facilities, and sanitary landfill sites (A1.2.2). These two audits will provide quantitative evidence of the waste sector's need for facilities, and the level of financing required for investments in these facilities. To reduce plastic leakage in the short term, the initial focus should be on upstream facilities such as waste

transport and centralized MRFs. The goal is to increase the recovery of recyclable plastic by improving the segregation, collection, and sorting of waste.

In the Roadmap's initial stage, the LGUs are expected to improve solid and plastic waste collection, including the procurement of suitable waste collection vehicles (A1.2.3). To support the LGUs in improving their performance in recovery or recycling plastic waste, the NSWMC would provide O&M training for LGU staff (A1.2.4). In addition, critical SWM infrastructure such as centralized MRFs, recycling facilities, and regional SLFs would be identified through an audit (A1.2.2), and after identifying SWM needs, feasibility studies would be carried out to plan and design the additional MRFs, recycling facilities, and regional SLFs (A1.2.5) that would be financed and constructed in the next phase (A2.1.2). As it could take up to five years for new SWM facilities to become operational, in order to increase plastic recovery in the existing MRFs, the NSWMC would provide O&M training to improve the LGUs' SWM performance (A1.2.4).

Actions to achieve Milestone M1.3 (Complementary SWM Legislation is Enacted)

Enact the three new laws that were proposed during the 18th Congress to support the reduction of non-recyclable SUPs where viable alternatives had been identified (A1.3.1), and introduce fiscal instruments to target the environmental impact of SUPs. These laws are: (i) the SUP Bag Tax Act, which proposes to impose a tax on SUP bags to reduce their consumption and improper disposal. This tax would be levied on the retailers that provide SUP bags at the point of sale, and the revenues generated would support plastic waste management initiatives, recycling programs, and the promotion of sustainable alternatives to SUP bags; (ii) the SUP Product Registration Act, which requires any business producing, importing, or distributing SUPs to register with the relevant authorities. This fiscal instrument should improve accountability, and the monitoring of SUPs' production and supply chains. Registration fees could also be imposed, which would generate revenues to fund monitoring, enforcement, and plastic waste management initiatives; and (iii) the Plastic Labeling Act, which focuses on the product labeling requirements for plastic packaging to improve the collection and segregation of recyclable plastic products, and reduce plastic leakage into the environment. The fiscal aspect of this act could involve imposing fines for non-compliance with the labeling requirements, which would contribute to the revenue pool for plastic waste management.

Collectively, the three proposed acts should create a comprehensive framework for achieving Outcome 1—*Plastic Leakage Pathways Closed* by: (i) discouraging the consumption of SUP bags, which would directly reduce the volume of SUPs in the environment (SUP Bag Tax Act); (ii) enhancing oversight and the management of the SUP supply chain to reduce the risk of leakage points; and (iii) empowering consumers to make informed choices, which would favor plastics with lower leakage potential, and promote the Circular Economy (Plastic Labeling Act). This new legislation would align with the broader objective of Outcome 1—*Plastic Leakage Pathways Closed by 2028* through minimizing plastic waste generation, enhancing plastic waste management systems, and protecting the environment and public health from the negative impacts of plastic pollution.

Before introducing these new SWM regulations and their incentive schemes, the negative impacts on vulnerable populations (A1.1.4) should be considered and addressed, including the financial implications for different actors in the system, and on government budgets.

The following Action (A1.3.2) requires amending the implementing rules and regulations for RA 9003, Section VIII in the NSWM Framework, in order to raise awareness about plastic waste, its impacts, and sustainable alternatives. For example, this should enable sharing information related to different plastic products and their sustainability, which would be based on their use of renewable and recycled materials. This should also increase communities' awareness about plastic waste's adverse public health and environmental impacts.

Actions to achieve Milestone M1.4 (National Database on Recycling and SWM is Set Up and Operationalized)

Having reliable and accessible information and data on plastic, waste, and related technology is essential for effective plastic waste management. This requires designing (A1.4.1), and publishing (A1.4.2) a national database that collects information from the LGUs on solid waste composition and generation. To establish this database, the DENR would issue a resolution that requires all of the LGUs, waste collectors, MRFs, recycling facilities, and SLF operators to report their waste inputs and outputs as part of the monitoring system. This database would also include information on plastic products placed on the market by obliged enterprises (such as those covered by the EPR Law). For reporting waste-related data, including data from the LGUs on waste composition and generation, the DENR would provide a standardized methodology and format. Additionally, in coordination with the LGUs, the DENR would provide training for key waste-related (including plastic) businesses on data collection, recording, reporting, and database access. The establishment, and the systematic operation of this database on all aspects of solid waste and plastic waste management, is critical. Achieving this Milestone (M1.4) will make key data publicly available on waste collection, recycling, disposal, and

littering; unlock better waste monitoring; and facilitate informed decision-making on plastic waste management. This, in turn, should increase stakeholders' and investors' trust in recycling.

Actions to achieve Milestone M1.5 (Technical Guidelines on a Cost-recovery Mechanism for Plastics and SWM are Adopted and Enforced)

The final set of short-term Actions addresses the adoption and enforcement of technical guidelines on the cost-recovery mechanism. These concern the post-fiscal devolution transition, which is expected to be extended from 2024 to 2027.[26] With the assistance of the NSWMC, a survey would be conducted on the waste collection fees that the LGUs and private haulers currently charge businesses (A1.5.1), and the results should help in determining appropriate waste collection fees for the residential sector. The DILG and the DENR would also develop technical guidelines for the LGUs on various cost-recovery mechanisms (A1.5.2), which would aid in setting up and operating local SWM Funds, and support resolutions to enable the LGUs to progressively increase their SWM budget.

Medium-term Actions and Milestones: Outcome 2—Plastic Recycling Enabled by 2034

The medium-term Actions presented in Figure 5.5, are expected to deliver Outcome 2—*Plastic Recycling Enabled by 2034*, and support achieving the following Roadmap Milestones:

M2.1. LGUs' Capacity to Carry Out Plastic and Solid Waste Management is Developed:

- A2.1.1. Build the capacity of the LGUs with staff training on how to prepare feasibility studies;
- A2.1.2. Establish new centralized MRFs, recycling facilities, and regional SLFs;
- A2.1.3. Establish a local SWM Office in each LGU, as authorized by the national LGU SWM Plan;
- A2.1.4. Develop O&M standards for MRFs, and an operations manual for barangays' SWM Committees; and,
- A2.1.5. Increase staff in the SWM Division of the DENR-EMB, and improve their technical capacity.

M2.2. Informal Sector is Integrated into the LGUs' SWM Systems:

- A2.2.1. Prepare guidelines for the registration and accreditation of informal workers in the LGUs' SWM system;
- A2.2.2. Issue minimum technical operating standards for junk shops; and
- A2.2.3. Pilot SWM projects that promote the integration of informal workers.

M2.3. Production of Good Quality Plastic Recyclates is Increased:

- A2.3.1. Develop national standards for the quality of plastic recyclates;
- A2.3.2. Increase the capacity of the recycling facilities; and,
- A2.3.3. Establish a plastic certification scheme for plastic recyclers.

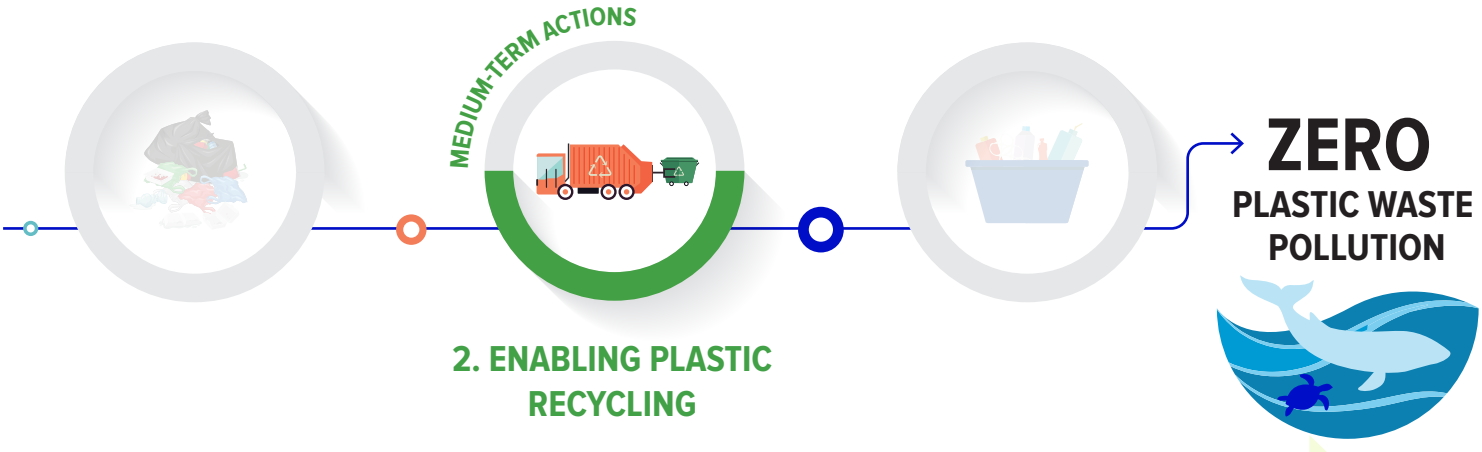
The medium-term Outcome (2023–2034)—*Plastic Recycling Enabled*—should be facilitated by the achievement of the short-term Milestones and their combined short-term Outcome—*Plastic Leakage Pathways Closed*. The medium-term Milestones are: (i) LGUs' Capacity to Carry Out Plastic and Solid Waste Management is Developed (M2.1); (ii) Informal Sector is Integrated into the LGUs' SWM Systems (M2.2); and (iii) Production of Good Quality Plastic Recyclates is Increased (M2.3). The Actions that supported achieving the short-term outcome of *Plastic Leakage Pathways Closed* should continue in order to sustain the reduction of non-recyclable SUPs and improve MRFs' operations. The medium-term Actions would build on these successes by improving recycling and the overall capacity of the LGUs to finance and manage plastic waste.

Actions to achieve Milestone M2.1 (LGUs' Capacity to Carry Out Plastic and Solid Waste Management is Developed)

First, the NSWMC, in cooperation with local banks, would provide training and capacity building for the LGUs to prepare them to capably oversee and assess the preparation of better-targeted feasibility studies and investment plans (A2.1.1). These comprise: environmental assessments, technology assessments, financial and economic analyses, procurement and implementation plans, cost estimates, and plans for sourcing funding to cover the development and operation of SWM projects. This assumes that because most LGUs and SWM investors lack the capacity to undertake this work, themselves, it would be carried out by private consulting firms with the necessary expertise. The training would be conducted on a regional basis for a cluster of LGUs by inhouse or outsourced specialists who work for the DENR-EMB and the NSWMC. These national agencies need to allocate the funds to finance these activities, and they can also secure grants from international development partners to support capacity development activities. These capacity-building efforts would be scaled up once the National Ecology Center is fully operational. Such capacity development

26 Mandanas Ruling, Executive Order No. 138, Series of 2021.

FIGURE 5.5. MEDIUM-TERM ACTIONS (2023–2034, AND BEYOND) IN THE PHILIPPINE PLASTIC WASTE MANAGEMENT ROADMAP



2023 ····· 2028 ····· 2034 ····· 2040

M2.1 LGUs' Capacity to Carry Out Plastic and Solid Waste Management is Developed

A2.1.1. Build the capacity of the LGUs with staff training on how to prepare feasibility studies;
A2.1.2. Establish new centralized MRFs, recycling facilities, and regional SLFs;
A2.1.3. Establish a local SWM Office in each LGU, as authorized by the national LGU SWM Plan;
A2.1.4. Develop O&M standards for MRFs, and an operations manual for barangays' SWM Committees; and
A2.1.5. Increase staff in the SWM Division of the DENR-EMB, and improve their technical capacity.

M2.2 Informal Sector is Incorporated into the LGUs' SWM Systems

A2.2.1. Prepare guidelines for the registration and accreditation of informal workers in the LGUs' SWM system;
A2.2.2. Issue minimum technical operating standards for junk shops; and
A2.2.3. Pilot SWM projects that promote the integration of informal workers.

M2.3 Production of Good Quality Plastic Recyclates is Increased

A2.3.1. Develop national standards for the quality of plastic recyclates;
A2.3.2. Increase the capacity of recycling facilities; and,
A2.3.3. Establish a plastic certification scheme for plastic recyclers.

Source: World Bank

initiatives are expected to increase the LGUs' sense of ownership for the SWM projects that they will implement. This Action (A2.1.1) builds on the feasibility studies that were conducted during the short-term phase to plan investments for designing and constructing additional MRFs, recycling facilities, and regional SLFs (A1.2.5), and it would be supplemented by the LGUs' sourcing funds to finance the construction of new, centralized MRFs; recycling facilities; and regional SLFs (A2.1.2). These Actions should all help to address the solid waste infrastructure gaps at the LGU level.

As authorized by the national LGU SWM Plan, the next Action is establishing a SWM Office in each LGU (A2.1.3) that is staffed with an adequate number of people who have been trained with the required skills (A2.1.1). The establishment of a SWM Office in the LGU should help to prioritize SWM-related decision-making, and the development and implementation of a local SWM Plan. The centralized MRFs and recycling facilities would also benefit from the development of standards for O&M, and an operations manual to guide the work of the barangays' SWM Committees (A2.1.4). These committees would be supported, too, by the training and capacity development provided to the LGUs (A1.2.4). At the national level, the focus would be on increasing staff in the Solid Waste Management Division of the DENR-EMB, and improving their technical capacity (A2.1.5).

Actions to achieve Milestone M2.2 (Informal Sector is Integrated into the LGUs' SWM Systems)

As noted previously, integrating informal workers is necessary because they play a significant role in the LGUs' recycling. The integration process would begin with preparing guidelines for the registration and accreditation of informal workers (A2.2.1) so that they can work in the LGUs' MRFs on recovering recyclables and composting. The MRFs' health and safety standards would also be improved to protect these workers. In addition, to maximize progress in integrating the informal sector, the NSWMC would issue minimum technical operating standards for junk shops (A2.2.2) so that they properly manage residual waste, and they record and report on the recyclables that they collect, process, and sell. The LGUs would also pilot projects that promote integrating the informal workers into the LGU plastic waste and solid waste management system (A2.2.3). These pilot projects would be a prelude to informal workers' more permanent engagement in the LGUs' SWM. By 2034, it is expected that the informal waste sector, including junk shops, consolidators, and waste pickers would be integrated into the formal SWM systems of the LGUs. Their integration would occur in all of the waste-related activities carried out by the LGUs, including waste collection, MRF operations, waste disposal, and the systematic recording of data on plastic waste and recycling in the data collection system.

Actions to achieve Milestone M2.3 (Production of Good Quality Plastic Recyclates is Increased)

In compliance with the relevant legislation, the NSWMC would develop national standards for the quality of plastic recyclates (A2.3.1). To prepare for this, under the short-term Outcome—*Plastic Leakage Pathways Closed*—pre-requisites such as improving waste collection and segregation equipment and infrastructure would have been carried out. In this medium-term phase, centralized MRFs would be constructed to maximize the value of the recyclable plastics that are collected. This should help in securing additional investments to increase the capacity of recycling facilities (A2.3.2) so that they can process a wider range of plastic resins such as linear low-density polyethylene (LLDPE) and polypropylene (PP) and high-density polyethylene (HDPE). To ensure high standards, a Plastic Certification Scheme for recyclers (A2.3.3) would be established, which would raise the quality of recycling facilities' outputs, and give suppliers confidence that any waste plastic delivered to the certified recyclers will be recycled with the best available technologies and practices. This Action targets traceability along the supply chain, throughout the recycling process, and the quality of recycled contents until the final recycled product is produced. DTI, [27]as the lead accreditation agency, would be responsible for specifying the procedures for certifying plastic recycling facilities.

Long-term Actions and Milestones: Outcome 3—Demand for Plastics Managed and Products Designed for Circularity by 2040

The long-term Actions, which are presented in Figure 5.6, are expected to deliver Outcome 3— *Demand for Plastics Managed and Products Designed for Circularity by 2040.* These Actions support achievement of the following three Milestones:

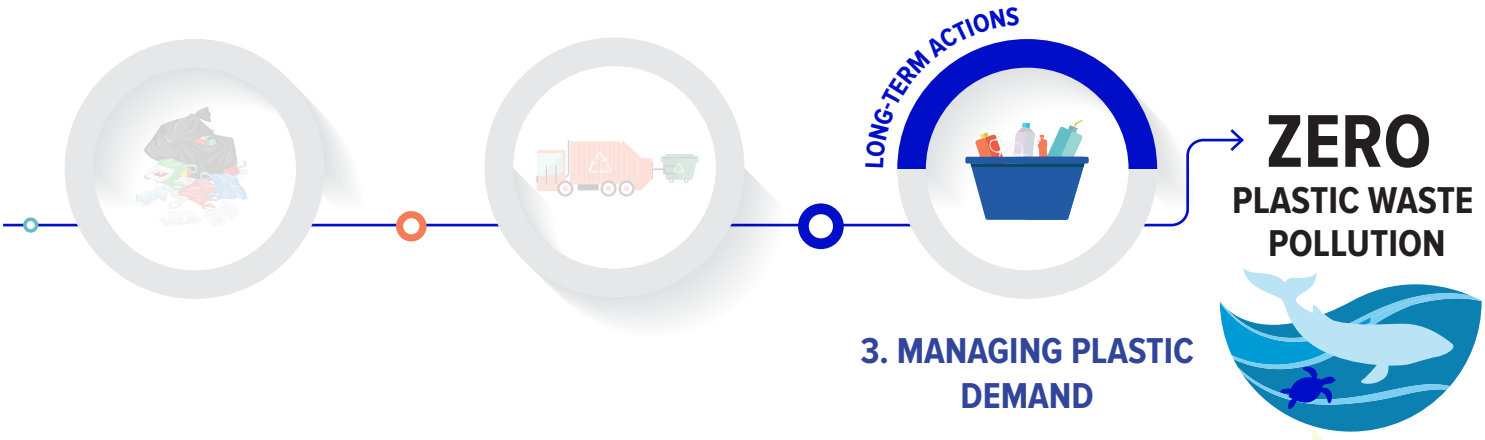
(i) M3.1. Measures for Eco-design, Eco-labeling, SUP Alternatives, and Green Public Procurement that Promote Plastics' Circularity are Adopted and Enforced:

- A3.1.1. Conduct life cycle assessments to identify options for eco-design, eco-labeling, and alternatives to SUPs, in the short term;
- A3.1.2. Develop and issue guidelines for compliance on eco-design and Green Public Procurement, in the medium term; and,
- A3.1.3. Initiate on-product and on-packaging information about proper plastic waste disposal, as a long-term Action.

(ii) M3.2. Private Sector is Engaged in Plastic Reduction and Waste Management:

27 Lead Agency responsible for expanding the recycling market (according to the IRR of RA 9003, Rule 12, Section 1).

FIGURE 5.6. LONG-TERM ACTIONS (2023–2040, AND BEYOND) – THE PHILIPPINE PLASTIC WASTE MANAGEMENT ROADMAP



2023 ····· 2028 ····· 2034 ····· 2040

M3.1 Measures for Eco-design, Eco-labelling, SUP Alternatives, and Green Public Procurement are Adopted and Enforced

A3.1.1. Conduct life cycle assessments to identify options for eco-designs, eco-labelling, and alternatives to SUPs, in the short term;
A3.1.2. Develop and issue guidelines for compliance on eco-design and Green Public Procurement, in the medium term; and,
A3.1.3. Initiate on-product and on-packaging information about proper plastic waste disposal, as a long-term Action.

M3.2 Private Sector is Engaged in Plastics' Reduction and Waste Management

A3.2.1. Define standards and guidelines to implement the EPR Law, in the short term;
A3.2.2. Assist micro, small, and medium enterprises to participate in an EPR program, in the medium term; and,
A3.2.3. Negotiate voluntary agreements with the private sector on eco-design, in the long term.

M3.3 Support for Nurturing In-country Innovation and Incentivizing Information Exchanges is Strengthened

A3.3.1. Develop and implement a communication strategy on plastic waste management;
A3.3.2 Conduct feasibility studies to implement energy recovery technologies that adhere to the environmental laws and other relevant policies; and,
A3.3.3. Establish a National Recycling Hub (NRH) to support partnerships, and share information among the Roadmap's diverse stakeholders.

Source: World Bank

- A3.2.1. Define standards and guidelines to implement the EPR Law, in the short term;
- A3.2.2. Assist micro, small, and medium enterprises to participate in an EPR program, in the medium term,
- A3.2.3. Negotiate voluntary agreements with the private sector on eco-design, in the long term.

(iii) M3.3. Support for Nurturing In-country Innovation and Incentivizing Information Exchanges is Strengthened.

- A3.3.1. Develop and implement a communication strategy on plastic waste management;
- A3.3.2 Conduct feasibility studies to implement energy recovery technologies that adhere to the environmental laws and other relevant policies; and,
- A3.3.3. Establish a National Recycling Hub (NRH) to support partnerships, and share information among the Roadmap's diverse stakeholders.

The long-term Outcome—*Demand for Plastics Managed and Products Designed for Circularity by 2040*—requires achieving the following Milestones: (i) Measures for Eco-Design, Eco-Labeling, SUP Alternatives, and Green Public Procurement that Promote Plastics' Circularity are Adopted and Enforced (M3.1); (ii) Private Sector is Engaged in Plastic Reduction and Waste Management (M3.2); and (iii) Support for Nurturing In-country Innovation and Incentivizing Information Exchanges is Strengthened (M3.3).

Actions to achieve Milestone M3.1 (Measures for Eco-design, Eco-labeling, SUP Alternatives, and Green Public Procurement that Promote Plastics' Circularity are Adopted and Enforced)

To facilitate the reduction of non-recyclable single-use plastic products in the market, which was initiated in 2023 under M1.1, a life cycle assessment should be undertaken to identify options for eco-design, eco-labeling, and alternatives to SUPs (A3.1.1). This will help to fast-track building knowledge and know-how, and allow sufficient time to raise awareness and promote the adoption of alternatives, eco-designs, and eco-labeling. This study should comprise both an LCA and a market analysis, and focus on products that can be easily replaced with locally available, single-use, non-plastic, and multi-use alternatives, or with highly recyclable or retrievable plastic alternatives.

For eco-design, the product groups that are the most responsible for plastic pollution should be identified. Then those products should be studied to determine which measures could increase their renewable content, reusability, recyclability, durability, and other waste-related performance characteristics that would make the greatest contribution in reducing plastic waste and minimizing the use of natural resources. The level of eco-design requirements should be established based on technical, economic, and environmental analyses, and then the best-performing products or technologies should be identified that are available in the Philippine market, and internationally. In the medium term (from 2028 to 2034), guidelines for eco-design and Green Public Procurement should be developed, and enforced (A3.1.2). The eco-design guidelines should require that products meet the eco-design requirements before they are placed on the market in the Philippines. Manufacturers and importers would then be required to declare (with a declaration of conformity) that their product complies with all the eco-design requirements. The Green Public Procurement programs of all government departments, offices, and agencies should also be amended to include plastic waste-related criteria. A key success factor, in the long term, will be negotiating voluntary agreements with private enterprises on eco-design (A3.2.3).

Regarding eco-labeling, a coding system should be created for packaging materials and products that indicates the type of plastic resin used. This labeling program would facilitate waste recycling and re-use; improve the reliability, comprehensiveness, and transparency of recyclability claims; and distinguish between different kinds of biodegradable plastic products.[28] The provision of detailed on-product and on-packaging information about proper plastic waste disposal (A3.1.3) would make waste recovery more efficient (in the longer term, after 2034).

Actions to achieve Milestone M3.2 (Private Sector is Engaged in Plastic Reduction and Waste Management)

The second set of Actions under M3.2, begins in the short term with defining standards and guidelines for implementing the EPR Law (A3.2.1). As required under the law, verified information on the type and quantity of plastics from the obligated producers must be available and consolidated with those recovered by waste diverters, processed by recyclers, and deposited in a SLF. The implementation of the EPR Law, and compliance with Green Public Procurement requirements should use a participatory approach by creating working groups comprised of representatives from government agencies; private businesses, including MSMEs; plastic producers; and other relevant stakeholders. The goal of these working groups would be to define standards and guidelines to implement the EPR Law, and how to finance plastic recovery through arrangements with PROs. Programs would also be developed in the medium term (A3.2.2), specifically, to assist MSMEs to participate, as these businesses have less capacity to adopt an EPR program and benefit from a PRO's arrangements, and especially from arrangements for financing plastics' recovery.

28 Industrially compostable, home-compostable plastic products, and those that biodegrade in other environments such as soil or seawater.

Actions to achieve Milestone M3.3 (Support for Nurturing In-country Innovation and Incentivizing Information Exchanges is Strengthened)

A communication strategy on plastic waste management should be developed (A3.3.1), which is based on the principles agreed on in the Stakeholders' Engagement Group (see HLA3 below). This communication strategy would list campaigns on topics that suit each stage of the Roadmap's implementation—for example, on the various impacts of plastic waste, the roles within EPR, and on SUP alternatives, in the early stages, and on quality standards for recyclates and eco-design in the later stages.

In the longer term, plastic producers would be fully engaged in reducing plastic waste and enhancing plastic circularity; reporting their data in the EPR system; adopting eco-design principles in placing their plastic products on the market; using packaging that can be easily reused or recycled; and identifying eco-designs, eco-labeling, and alternatives to SUPs that have undergone LCAs (A3.1.1). As a key Milestone (M3.1), the SUPs that have environmentally sound alternatives should be progressively restricted in the market and eventually phased out. Finally, in the longer-term, the EPR Law would be fully implemented and enforced to achieve its waste recycling and recovery targets.

The feasibility of energy recovery technologies that adhere to environmental laws and relevant policies should be studied (A3.3.2) when the earlier stages of SWM, such as collection and recycling, have been improved (A1.2.3). This would then be a continuation of earlier Actions on waste characterization, and on the optimization of waste collection and recycling undertaken by the LGUs, and the resulting feedstock would be available and appropriate for the energy recovery technologies (A3.3.2). Knowledge-sharing programs with other countries within, and outside the Asia Pacific Region, could facilitate the identification and adoption of energy-recovery technologies that would be suitable for the Philippines' context.

A National Recycling Hub should be established to support partnerships and information sharing among the diverse stakeholders that are responsible for plastic waste management and recycling (A3.3.3). This Action would build on the previous short-term Action (A1.4.2), which published data on waste collection, waste disposal, recovered recyclables, processed biodegradables, and recycled plastics. By bringing together recycling operators, plastic producers, the LGUs, and private investors, the Recycling Hub would promote information sharing, and facilitate partnerships and other types of collaboration that could lead to new ventures for developing waste diversion infrastructure.

Cross-cutting, High-level Actions toward the Goal of Zero Plastic Waste Pollution by 2040

The following High-level Actions (HLAs), which are spread across the three Outcomes' Milestones, comprise central government-level Actions to support and facilitate the implementation of the Roadmap.

(i) HLA1. Monitor, evaluate, report on, and verify the Roadmap's progress, and the status of plastic waste pollution in the Philippines. Regular monitoring and evaluation of the implementation of all of the Actions should be carried out by the participating government agencies and other stakeholders. Based on these assessments, to ensure the sustainable management of plastic waste, the Actions and Milestones in the Roadmap could be revised in accord with the institutional arrangements for implementing and monitoring the Roadmap's Actions (see Section 5.4);

(ii) HLA2. Achieve progress in finding sources of funds and managing finances by improving government procedures to facilitate the LGUs' access to funding sources, and simplifying the guidelines and requirements for loan and grant applications for plastic and SWM projects; and,

(iii) HLA3. Initiate a Stakeholders' Engagement Plan to: assist with the overall implementation of the Roadmap; define the principles for the communication strategy on plastic waste management (A3.3.1); understand how various SWM regulations impact vulnerable populations, and identify the responses needed to minimize these negative impacts (A1.1.4)

In large urban centers with a high population density, solid waste tends to be better managed because cities have better solid waste infrastructure; established waste collection systems, MRFs, and recycling facilities; and a thriving informal waste sector. Thus, urban centers have greater capacity to handle different types of plastic waste, including packaging materials, and household and industrial plastics.

Thematic approach for Roadmap Actions

The LGUs' lack of staff capacity and adequate technologies have been identified as barriers to effective SWM (Table 5.1). As noted previously, because urban centers are the key source of plastic waste, the Roadmap targets the Philippines' metropolitan cities, highly urbanized cities, and emerging cities and municipalities (see Section 2.1). In large urban centers with a high population density,[29] solid waste tends to be better managed because cities have better solid waste infrastructure; established waste collection systems, MRFs, and recycling facilities; and a thriving informal waste sector. Thus, urban centers have greater capacity to handle different types of plastic waste, including packaging materials, and household and industrial plastics. Recycling initiatives may be more accessible for residents, and waste segregation practices may be better. Thus, in accord with the Roadmap's Short-term Outcome (*Plastic Leakage Pathways Closed by 2028*), cities should increase the capacity and improve the performance of their SWM infrastructure and services, while working in parallel to prioritize reduction of non-recyclable SUPs. This means that cities would implement the Roadmap as it is presented in this report. However, away from the highly urbanized and densely populated cities of the Philippines, on small, remote islands, plastic and solid waste management issues differ, and the Roadmap needs to be tailored to their needs. This is due to the limited land area of these islands, their fragile ecosystems, and their heavy dependence on marine resources—all of which are seriously impacted by plastic pollution:

(i) Islands with a tourist industry often face challenges in managing their plastic waste because they have limited solid waste infrastructure, and tourists' SUPs increase waste generation. During the tourist season, temporary waste management facilities and more frequent waste collection may be required to cope with the increase in waste. Thus, islands with a tourist industry should prioritize: (i) reduction of non-recyclable SUPs to prevent the haphazard disposal of plastic waste on land and in the marine environment; (ii) training hotel, restaurant, and catering staff to use and promote alternatives to improve facilities' recycling and composting of waste; (iii) mitigating the impact of waste on the island's fragile ecosystem by educating tourists and residents about responsible plastic waste disposal practices; and (iv) financing proper waste management infrastructure, including recycling facilities, by imposing a tourist-related tax on hotels and restaurants. Other strategies could include installing litter traps in water bodies, and organizing beach clean-ups.

(ii) Remote and undeveloped islands often face challenges in coping with solid waste due to their lack of SWM infrastructure and services. If no waste management infrastructure is available on remote islands, solid waste, including plastic waste, is dumped on vacant

BOX 5.1.
EXAMPLES OF PLASTIC WASTE MANAGEMENT IN ISLAND COUNTRIES WITH MAJOR TOURIST INDUSTRIES

Jamaica, a Caribbean island, has banned SUP bags and Styrofoam products, which has reduced plastic leakage into the marine environment. In partnership with the private sector, Jamaica's government has established plastic bottle recycling programs that collect and process plastic bottles for reuse. The government has also invested in beach clean-ups and educational campaigns to raise people's awareness about the negative impact that plastic waste has on marine ecosystems.

Indonesia, an archipelago in Southeast Asia, with the second longest coastline in the world, faces similar SWM challenges as the Philippines. To resolve these challenges, the government has set ambitious targets for reducing plastic waste, and it engages in regional and international cooperation to address the plastic pollution crisis. To incentivize communities to separate and recycle plastic waste, the government finances the establishment of waste banks. The national campaign "Clean Indonesia" organizes waste clean-ups and provides waste management education. In 2023, the government was also considering developing waste-to-energy facilities.

The Maldives, an archipelago in the Indian Ocean, prioritizes sustainable waste management to protect its pristine marine environment, which is the basis for its tourism industry. The government has implemented a ban on SUPs, nationwide, which targets plastic bags, straws, and bottles; it has established waste collection centers and recycling facilities; it organizes beach clean-ups that involve residents and tourists; and it conducts educational programs to promote responsible waste management.

29 According to the Philippine Statistics Authority's 2020 Census, the region of Calabarzon was the most populous one in the country, with more than 14.4 million inhabitants. This was followed by the National Capital Region (NCR) with 13.5 million inhabitants. Calabarzon was the country's second most densely populated region after the NCR (Philippine Statistics Authority 2021).

land, improperly buried, and burned. The lack of comprehensive waste management infrastructure and services increases the likelihood that plastic waste will leak into the ocean and negatively impact the aquatic ecosystem. Development of pre-treatment facilities for recyclables at the centralized MRF level or at the EMB-funded MRFs would be more efficient. The pre-treated recyclables, which would be either cleaned and flaked, crushed, or baled, could then be transported more easily to nearby recyclers or consolidators. With regard to recycling, residents rely heavily on manual sorting, and the limited recycling activities usually focus on higher-value plastic. In small islands with a low population density, rather than invest in waste treatment and recycling infrastructure, these islands should make reduction of non-recyclable SUPs a high priority, and focus on limiting their use, and promoting reusable packaging.

As discussed previously (see Section 4 and Table 5.1), the Actions supporting each of the three key Outcomes in the Roadmap, and measured by the various Milestones, were sorted into four thematic areas based on the barriers identified in consultations with stakeholders: These barriers are: (i) Policy and Institutional; (ii) Analytical and Infrastructure; (iii) Financial and Funding; and (iv) Data and Information. These are presented in Table 5.2 on government agencies' proposed roles for each Action, and in Annex B.

TABLE 5.2. THEMATIC APPROACH – PHILIPPINE PLASTIC WASTE ROADMAP: ADDRESSING THE BARRIERS

	GOAL: Zero Plastic Waste Pollution (2040)		
	OUTCOMES		
	Closing Plastic Leakage Pathways (2023–2028)	**Enabling Plastic Recycling (2023–2034)**	**Managing Plastic Demand (2023–2040)**
Milestones	**M1.1. Non-Recyclable SUPs are Reduced**	**M2.1. LGUs' Capacity to Carry Out Plastic and Solid Waste Management is Developed**	**M3.1. Measures for Eco-design, Eco-labeling, SUP Alternatives, and Green Public Procurement that Promote Plastics' Circularity are Adopted and Enforced**
	M1.2. Plastic Recovery from Existing Facilities is Increased	**M2.2. Informal Sector is Integrated into the LGUs' SWM systems**	**M3.2. Private Sector is Engaged in Plastic Reduction and Waste Management**
	M1.3. Complementary SWM Legislation is Enacted	**M2.3. Production of Good Quality Plastic Recyclates is Increased**	**M3.3.Support for Nurturing In-country Innovation and Incentivizing Information Exchanges is Strengthened**
	M1.4. National Database on Recycling and SWM is Set Up and Operationalized		
	M1.5. Technical Guidelines on a Cost-recovery Mechanism for Plastics and SWM are Adopted and Enforced		
Policy and Institutional	**HLA3. Initiate a Stakeholders' Engagement Plan**		
	A1.1.1. Strengthen the regulatory framework to reduce non-recyclable SUPs through enforcing existing and new regulations on SUPs, plastics, and SWM.		
	A1.1.2. Enforce the resolutions and ordinances of the EPR Law.		
	A1.3.1. Enact the laws that support the reduction of non-ecyclable of SUPs.	A2.1.3. Establish a local SWM Office in each LGU, as authorized by the national LGU SWM Plan.	A3.2.1. Define standards and guidelines to implement the EPR Law, in the short term.
		A3.1.2. Develop and issue guidelines for compliance on eco-design and Green Public Procurement, in the medium term.	
	A1.3.2. Amend Section VIII of RA 9003's IRR in the NSWM Framework to raise awareness about plastic waste, its impacts, and sustainable alternatives.	A2.1.5. Increase staff in the SWM Division of the DENR-EMB, and improve their technical capacity.	A3.2.2. Assist micro, small, and medium enterprises to participate in an EPR program, in the medium term.
		A2.2.1. Prepare guidelines for the registration and accreditation of informal workers in the LGUs' SWM system.	A3.2.3. Negotiate voluntary agreements with the private sector on eco-design, in the long term.
		A2.3.1. Develop national standards for the quality of plastic recyclates.	

	GOAL: Zero Plastic Waste Pollution (2040)		
	OUTCOMES		
	Closing Plastic Leakage Pathways (2023–2028)	**Enabling Plastic Recycling (2023–2034)**	**Managing Plastic Demand (2023–2040)**
Analytical and Infrastructure	A1.2.3. Improve plastic and solid waste collection, including procuring waste collection vehicles.	A2.1.2. Establish new centralized MRFs, recovery or recycling facilities, and regional SLFs.	A3.3.2. Conduct feasibility studies to implement energy recovery technologies that adhere to the environmental laws and other relevant policies.
	A1.2.5. Conduct feasibility studies to plan investments for designing and constructing additional MRFs, recycling facilities, and regional SLFs.	A2.2.2. Issue minimum technical operating standards for junk shops.	
	A1.1.3. Increase the waste management capacity of selected priority sectors such as tourism.	A2.2.3. Pilot SWM projects that promote the integration of informal workers.	
	A1.4.1. Design a database on plastic recovery and recycling.	A2.3.2. Increase the capacity of recycling facilities.	
Financial and Funding	**HLA2. Achieve Progress in Finding Sources of Funds and Managing Finances**		
	A1.5.1. Survey LGUs and the private sector regarding the waste collection fees they charge businesses.		
	A1.5.2. Prepare technical guidelines on cost-recovery mechanisms plastic waste management.		
Data and Information	**HLA1. Monitor, Evaluate, Report on, and Verify the Roadmap's Progress, and the Status of Plastic Waste Pollution in the Philippines**		
	A1.1.4. Develop understanding of the distributional impacts of SWM and plastic policies, laws, and regulations, and how to minimize negative impacts.		
	A3.1.1. Conduct life cycle assessments to identify options for eco-designs, eco-labeling, and alternatives to SUPs, in the short term.		
	A1.2.1. Audit LGUs' waste collection systems to identify facilities that could be the focus for short- and medium-term actions for increasing recovery.	A2.1.1. Build the capacity of the LGUs with staff training on how to prepare feasibility studies.	A3.1.3. Initiate on-product and on-packaging information about proper plastic waste disposal, as a long-term Action.
	A1.2.2. Conduct an audit to develop an inventory of the existing MRFs, recycling facilities, and sanitary landfill sites.	A2.1.4. Develop O&M standards for MRFs, and an operations manual for barangays' SWM Committees.	A3.3.1. Develop and implement a communication strategy on plastic waste management.
	A1.2.4. Train SWM facility staff on O&M to improve their performance in recycling plastic waste.		
	A1.4.2 Publish data on waste collection, recovered recyclables, processed biodegradable, disposed of waste, and recycled plastic.	A2.3.3 Establish a plastic certificate scheme for plastic recyclers.	

5.4 Roadmap – Proposed Institutional Set-up

The National Solid Waste Management Commission (NSWMC) is expected to provide overall policy direction and coordinate the work of the government agencies and the LGUs that will be responsible for implementing the Roadmap. The NSWMC is comprised of representatives from the Department of Environment and Natural Resources (DENR), Department of Trade and Industry (DTI), Department of Science and Technology (DOST), Department of the Interior and Local Government (DILG), Metropolitan Manila Development Authority (MMDA), Department of Health (DOH), Department of Agriculture (DA), Union of Local Authorities of the Philippines (ULAP), NGOs, and the private sector. At the LGU level, policy guidance would be provided by the local SWM Board; however, policy making and enforcement would be the responsibility of the local legislative council and its chief executive. Table 5.5 and Annex B list the roles and responsibilities of the government agencies and institutions that would be responsible for implementing the laws and ordinances concerning plastic and solid waste management.

TABLE 5.3. GOVERNMENT INSTITUTIONS' POTENTIAL ROLES AND RESPONSIBILITIES IN IMPLEMENTING THE PHILIPPINE PLASTIC WASTE MANAGEMENT ROADMAP

Institutions	Potential Roles and Responsibilities
National Solid Waste Management Commission (NSWMC)	**Serves as the lead agency for implementing the Roadmap:** • Acts as the coordinating body for policymaking, planning, and implementing the regulation of plastic waste under RA 9003 (2000), and its amendments; • Coordinates with all of the agencies and institutions involved in the Roadmap's implementation; • Issues the list of non-environmentally acceptable products (NEAPs) prohibited under RA 9003 (Outcome 1); • Guides the LGUs in institutional strengthening, improving waste collection and treatment, and incorporating informal workers into the formal SWM system (Outcome 2); and • Enforces the implementation of the EPR Law.
National Ecology Center (NEC)	**Serves as the key agency under the NSWMC:** • Identifies, reviews, and updates the list of NEAPs and plastic packaging materials to phase them out (Outcome 1); • Collaborates with academic and training institutions in developing the capacity of the LGUs and the private sector to carry out effective solid waste management, operate and maintain SWM facilities, and enforce solid waste regulations (Outcome 2); • Establishes, manages, and disseminates information about the comprehensive, publicly available SWM database, which provides technical and operational approaches to resource recovery, the diversion rate for each type of plastic waste and its recovery and diversion cost, and appropriate plastic management technologies (Outcome 3); • Promotes the development of the recycling market by establishing a national network to enhance opportunities to recycle; and • Acts as the networking hub for the LGUs, industry, and NGOs on cleaner production and cleaner technologies for SWM.
Department of Environment and Natural Resources (DENR)	**Plays a leading role as the chair of the NSWMC, the head of the NEC, and in operating the NSWMC Secretariat:** • Authorizes methods and parameters to measure waste reduction, collection, and disposal; • Provides technical and other capacity-building assistance on SWM for the LGUs; • Prepares the IRR and the National Framework for All Types of Product Waste, as well as implementation of the EPR Law; • Leads and collaborates with other agencies and stakeholders in determining the targets for recycled content in packaging materials; • Provides guidelines on the diversion of packaging materials; • Formulates and adopts the credit system for Plastic Footprint Reduction Accomplishments; • Monitors and evaluates the compliance of the Obligated Enterprises/PROs with the EPR Law; and • Assists in securing SWM data from the LGUs for inclusion in the National Ecology Center database.
Department of Trade and Industry (DTI)	**Serves as the key agency in implementing actions to improve recycling (Outcome 2):** • Collaborates with other government agencies and manufacturers in formulating standards for the appropriate environmental labeling of products and packaging by enterprises, whether they are covered by the EPR Law or not (Outcome 3); • Develops and promotes the adoption of Plastic Product Footprint generation and recovery standards; • Develops and promulgates a standardized compliance auditing manual under the EPR Law; • Collaborates with the National Ecology Center in establishing and managing a solid waste management information database; • Conducts and publishes studies on the markets for processing and purchasing recyclable materials, and perspectives about how to improve these markets; • Improves the collection and processing of post-consumer materials; and • Assists micro, small, and medium enterprises in participating in an EPR scheme.

Institutions	Potential Roles and Responsibilities
Department of Science and Technology (DOST)	**Supports and manages its offices—the Industrial Technology Development Institute, Environmental and Biotechnology Division, Materials Science Division, and Packaging Technology Division—in implementing the Roadmap (Outcomes 2 and 3):** • Initiates studies on alternatives to non-recyclable and non-reusable materials; • Develops environmental technology verification programs to evaluate technologies prior to their introduction in the Philippines; • Promotes clean technology and production programs in the industrial sector; • Fosters new and enhanced solid waste collection and disposal for processing and recovering materials and energy, and improving the use of organic material as fertilizer and biofuel; and • Conducts studies on new uses for recovered resources.[30]
Department of Health (DOH)	**Supports the implementation of the Roadmap (Outcome 2):** • Raises awareness about the health risks of mismanaged plastic waste, and especially within the informal sector; • Spearheads studies on the negative health impacts that handling solid waste has on garbage collectors, waste pickers, and other personnel working in SWM; • Develops training guidelines for waste collectors and other personnel on handling solid waste, safely;[31] and • Prepares a Health Care Waste Management Manual on the safe sorting, collection, transport, treatment, storage, and disposal of medical waste.[32]
Department of Labor and Employment (DOLE)	**Plays a supporting role in the implementation of the Roadmap:** • Ensures the safety of informal workers (Outcome 2).[33]
Department of Tourism (DOT)	**Plays a supporting role in the implementation of the Roadmap:** • Issues National Accommodation Standards (Outcome 1); • Collaborates with the private sector, LGUs, and other stakeholders to produce guidelines for hotels to follow the reduction of non-recyclable SUPs; • Facilitates awareness raising on SUPs and their alternatives through education and training for hotel operators; and • Encourages voluntary pledges by hotels and other tourist-related establishments to reduce their use of SUPs.
Department of the Interior and Local Government (DILG)	**Plays a key supporting role in helping the LGUs to implement the Roadmap:** • Assists the Philippines' President in overseeing supervision of the LGUs;[34] • Facilitates setting up Solid Waste Management Boards (SWMBs); • Collaborates with the National Economic and Development Authority, the Department of Environment and Natural Resources, and the various LGU leagues in establishing a coordinating mechanism for advising the LGUs on how to prepare their SWM Plans; • Conducts studies on the markets for processing and purchasing recyclable materials, and on taking the necessary steps to expand these markets; • Publishes an inventory of all the solid waste disposal facilities and sites in the country; • Conducts continuing education and information campaigns on SWM; and • Enforces compliance regarding prohibited acts and penalties.[35]

30 DENR AO 2001-34.

31 DENR AO 2001-34.

32 Sec. 3 (e), OP AO 16, s. 2019.

33 An Act Strengthening Compliance with Occupational Safety and Health Standards and Providing Penalties for Violations Thereof.

34 Executive Order No. 262 (1987): Reorganizing the Department of Local Government and for Other Purposes.

35 DENR AO 2001-34.

Institutions	Potential Roles and Responsibilities

Local government unit (LGU)	**Plays a key role in implementing the Roadmap (Outcomes 1, 2, and 3):**
	• Implements and enforces RA 9003, and its amendments within the LGU's respective jurisdiction, and in line with RA 7160 (1991);
	• Institutes the creation of a SWM Board at the provincial, city, and municipal level, and an SWM Committee at the barangay level;
	• Prepares, submits, and executes a 10-year LGU Solid Waste Management Plan;
	• Enforces mandatory solid waste diversion;
	• Implements the mandatory segregation of solid waste;
	• Establishes an MRF in each barangay or cluster of barangays;
	• Closes all open dumpsites and constructs SLFs to replace these by 2026;
	• Launches reclamation programs and buy-back centers for recyclables and toxic wastes;
	• Through a local ordinance, strengthens institutional capacity by setting up an LGU Environment and Natural Resources Office (ENRO) or a Solid Waste Management Office (SWMO);
	• Enacts ordinances, in consultation with the DENR, DTI, DOST, the private sector, and other entities to:
	  • prohibit SUPs that can be easily phased out (Outcome 1);
	  • require the registration of junk shops;
	  • impose SWM fees to enhance cost-recovery mechanisms;
	  • employ informal workers in the operation of MRFs;
	  • support the tourism sector in reduction of non-recyclable single-use plastics;
	• Allocates a budget for training LGU staff on SWM;
	• Supports implementation of the EPR Law by setting up partnerships with the Obligated Enterprises, Producer Responsibility Organizations, and MSMEs.

The Department of Finance is indirectly involved in the financing, and especially the public funding of plastic and solid waste management, and under the Green Jobs Act, it incentivizes industries to support the Circular Economy by implementing recycling and the recovery of their waste.

The potential institutional roles that are presented in Table 5.3 align with the mandate of each agency, however, these need to be agreed on by the leadership of the national government, and by the heads of each government agency.

The main responsibilities for plastic management and the interlinkages between the different agencies in implementing the Roadmap are presented in Figure 5.7.

5.5 Roadmap – Key Stakeholders' Engagement

In addition to the government agencies discussed above, the other major stakeholders involved in implementing the Roadmap are private companies, NGOs, and consumers. Systematic engagement with these stakeholders, which are described below, is a key factor in successfully implementing the Roadmap and achieving its goal of *Zero Plastic Waste Pollution by 2040*. Government agencies' engagement with these stakeholders should focus on understanding how they are impacted by the Roadmap's Actions so that effective measures can be taken to reduce any adverse impacts. Guidelines and programs should also be developed to adequately inform and build these stakeholders' capacity to participate in relevant Roadmap activities.

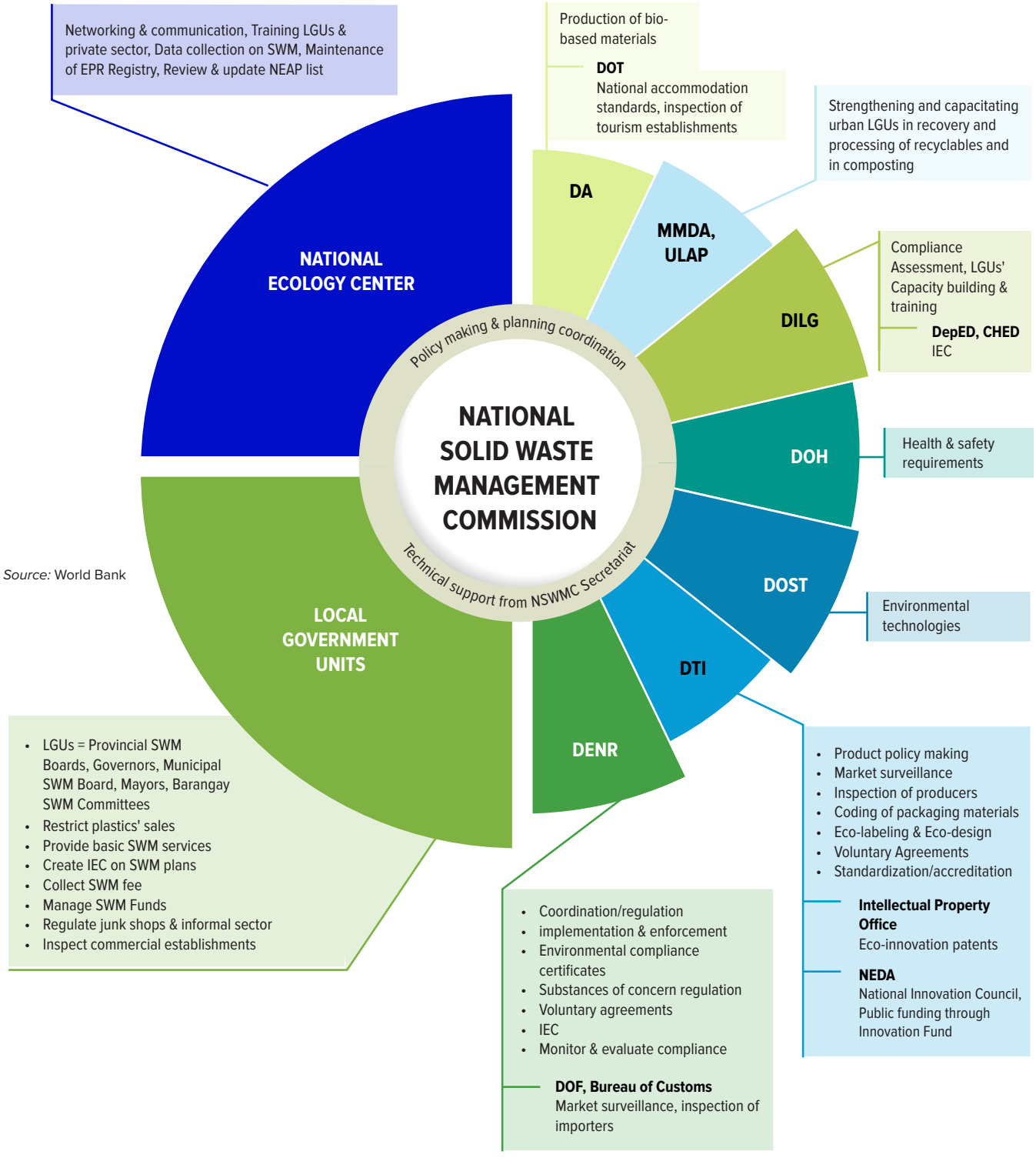
Plastic producers and importers (Outcome 3): Private companies launched the Philippine Alliance for Recycling and Materials Sustainability (PARMS) in 2014 to develop and implement holistic and comprehensive programs to eliminate waste across the entire plastic value chain. In doing so, PARMS aims to improve the efficiency of resource utilization, and reduce the need for SLFs. Another important stakeholder in the private sector is the Philippine Plastics Industry Association (PPIA). Some multinational companies are key players, too, as some of their brands are responsible for substantial amounts of residual waste.

Producers and importers of alternatives to SUPs (Outcome 3): The producers and importers of SUP alternatives are expected to increase as the market shifts toward more sustainable consumption patterns. The businesses that manufacturer SUP alternatives in the Philippines often use locally available materials (for example, *bayongs* are woven bags or baskets made from several types of leaves that grow in the Philippines).

Retailers and the hotel, restaurant, and catering sector that distribute SUPs (Outcome 1): Commercial establishments, including retailers; sari-sari shops;[36] the hotel, restaurant, and catering (HORECA) sector; and street vendors sell or

36 Sari-sari shops are small stores in the community that sell inexpensive products used in everyday life, and many of these food and household products are sold in small amounts in plastic sachets.

FIGURE 5.7. POTENTIAL INTERACTIONS AMONG GOVERNMENT AGENCIES IN IMPLEMENTING THE PHILIPPINE PLASTIC WASTE MANAGEMENT ROADMAP



Source: World Bank

give SUPs to consumers. Additional SUP distributors are street markets, wet markets, supermarkets, and department stores. MSMEs are a subset of these stakeholders, and they are both consumers and distributors of SUPs. The ability of these businesses to shift to selling and distributing SUP alternatives is a key success factor in implementing the Roadmap.

Waste management and recycling operators (Outcome 2): Most suppliers of recycled resins in the Philippines are SMEs, and these are challenged by their lack of scale, inefficient management, their outdated technology, and the informal and fragmented waste supply networks that operate on cash-only terms. Local recyclers also face challenges related to: competition from the suppliers of imported virgin plastic that are inexpensive due to low oil prices (mid-2023), unclear government policies regarding the use of recycled resins in food-contact applications, and the low availability of feedstock due to poor collected-for-recycling rates. Only a few manufacturers of recycling technologies are located in the Philippines, and these are mostly in Luzon, near Manila. Waste treatment technologies are considered expensive, and their O&M requires specialized skills.

Informal waste sector (Outcome 2): The SWM system in the Philippines employs thousands of informal workers who depend on separating highly valuable recyclables for their livelihood. These informal workers comprise waste pickers and buyers, "jumpers" who work on the waste collection trucks, garbage clean-up crews, waste reclaimers, and the owners of small junk shops that buy and consolidate materials to sell to recyclers. Thousands of informal workers have no alternative as they lack the skills and opportunities to do anything else. Since their work is unregulated, these key SWM stakeholders have no legal rights or protection from the health and safety risks of working with solid waste. A key success factor in implementing the Roadmap will be integrating the informal sector into the LGUs' solid waste management systems (Outcome 2).

Consumers (Outcome 1): SUPs continue to predominate in Philippine consumers' waste, and their behavior contributes to plastic pollution in two ways: (i) consumers purchase plastic products, and especially SUPs; and (ii) consumers' SUPs become litter. The high value placed on convenience in everyday life means that consumers rely heavily on short-lived, disposable plastic items, and the convenience of these discourages the transition to reusable alternatives. Reducing the enormous waste and consequent litter produced by SUPs requires persuading consumers to switch to more environmentally friendly single-use and multi-use alternatives, and to buy products in bulk instead of buying small portions in sachets. Enacting and enforcing local regulations to reduce non-recyclable SUPs (Outcome 1) is the fastest way to get consumers to change their behavior and progress toward achieving the Roadmap's goal of *Zero Plastic Waste Pollution by 2040*.

NGOs and civil society organizations (Outcome 3): A number of NGOs and social enterprises in the Philippines are active in plastic waste management through the bottom-up initiatives they operate. Examples include "Aling Tindera" by the Plastic Credit Exchange (PCX) (World Bank 2021a), "Basura Bangka" by Pure Oceans, the "Waste Watchers" Project by Save Philippine Seas, "Bin Exchange" by Clean Our Oceans, and TrashCan. These initiatives play an important role in complementing the waste reduction efforts of national government agencies and the LGUs, and they provide examples for the PROs to follow in addressing the problems caused by the plastic waste they generate.

Educators and researchers (Outcome 3): Educators are key stakeholders in reducing solid waste pollution due to the significant role they can play in promoting awareness and improving knowledge about the importance of environmental sustainability. Schools and universities can raise students' awareness, and also educate the public about the negative impact that SUPs and improper solid waste disposal have on the environment. Academic and independent researchers play an important role, too, through conducting research that supports the technological advances needed to boost the production and consumption of sustainable alternatives to polluting plastics. Such research should receive greater attention, encouragement, and financial support from both government and the private sector.

Mass media (Outcome 3): Mass media (radio, television, newspapers, websites, and social media), as well as the advertising and public relations industry are important stakeholders due to their ability to raise awareness and disseminate information that promotes public discourse about the need to eliminate SUPs and avoid littering.

Analytical work to assess the distributional impacts of plastic waste management

As noted previously, an important Action (A1.1.4) for achieving Outcome 1—*Plastic Leakage Pathways Closed by 2028*, is developing understanding about how the positive and negative impacts of plastic-related regulations vary across different socio-economic groups. Variations in impact arise because of the varying costs, benefits, and responsibilities associated with plastic waste management.

Additional analytical work is recommended to fully assess the distributional impacts of plastic waste management, which includes: (i) A comprehensive socio-economic impact assessment to better understand how the impact of plastic waste management actions and measures may vary across different stakeholders. This assessment would

review the costs, benefits, and varying impacts on the producers of plastic products, businesses that use these, and consumers, including vulnerable groups; (ii) A cost-benefit analysis that evaluates the economic implications of plastic waste initiatives by assessing the financial costs incurred by various stakeholders versus the expected long-term benefits; (iii) An environmental impact assessment that identifies the environmental impacts of plastic waste management initiatives versus their effectiveness and potential trade-offs. This assessment would identify sustainable practices that minimize and mitigate potential negative environmental impacts; (iv) Stakeholder analyses on how to sustain engagement with the stakeholders that were identified and consulted in preparing the Roadmap, and ensure their ongoing participation; and (v) A social equity assessment that identifies and addresses potential disparities and ensures fair outcomes for all stakeholders by better understanding the power dynamics that affect them, and the potential conflicts of interest that could arise.

This report is based on the results of the stakeholder consultations presented in Section 5.5 and Annex D, which included identifying vulnerable populations and gaining some preliminary understanding about the varying impacts that regulations and policy measures could have on them. This consultation process, which first identified barriers, and then contributed to the design of the Roadmap, indicates the high level of engagement with various stakeholders. However, this does not constitute a Stakeholders' Engagement Plan. Preparing that under High-level Action 3 (HLA3) to assist with overall implementation of Roadmap, will involve defining the principles for developing and implementing a communication strategy (A3.3.1); and evaluating how the impact of the regulations and measures to reduce non-recyclable SUPs could vary across different vulnerable populations, and identifying how to minimize negative impacts (A1.1.4). These varying impacts of reduction of non-recyclable SUPs on different stakeholder groups are summarized in Table 5.4:

TABLE 5.4. EXPECTED IMPACTS OF REDUCTION OF NON-RECYCLABLE SUPS ON STAKEHOLDERS ACROSS THE PLASTIC VALUE CHAIN – PHILIPPINE PLASTIC WASTE MANAGEMENT ROADMAP

Plastic Value Chain	Stakeholders	Milestones	Roadmap Impact
Plastic Production and Consumption	Plastic Producers and Importers	**M1.1 and M3.2:** Address the responsibility for SUPs and plastic packaging production	**Outcome 1.** Plastic producers and importers may suffer a slight negative economic impact from the reduction of non-recyclable SUPs (bans, restrictions, and EPR). For example, EPR will increase the cost of manufacturing and imports. The negative impact on producers and importers could be avoided if they shift to SUP alternatives.
	Producers and Importers of Alternatives	**M3.3:** Need to compete with lower-priced SUPs	**Outcome 1.** Producers of alternatives would likely benefit from policies that phase out SUPs and promote alternatives.
	Consumers	**M1.1:** Enforce non-recyclable SUPs' reduction	**Outcome 1.** Reduction of non-recyclable SUPs and requiring the use of higher-priced alternatives could have negative impacts on the poorest segment of the population (street-vendors and informal workers).
Waste Generation	HORECA	**M3.3:** Distribute SUPs	**Outcome 3.** Strong collaboration across agencies is required to develop and implement policies to reduce non-recyclable SUPs. Some resistance is expected due to the higher price of SUP alternatives.
	Consumers	**M3.3:** Change consumption behavior	**Outcome 1.** The generation of SUP waste will decrease, but the waste from SUP alternatives could increase.
Waste Collection	Informal Waste Sector (Junk Shops)	**M3.2 and M1.4:** Mostly undocumented and unregulated; no systematic data reporting	**Outcomes 1 and 3.** Once SUP collection and recycling is regulated, private haulers and junk shops may resist complying with the new registration, taxation, and data reporting requirements.
	Informal Waste Sector (Waste Pickers)	**M2.2:** Unhealthy and unsafe working conditions	**Outcome 2.** The quantities of SUPs for informal waste pickers to collect will decline, and they will have to compete for these with the LGUs, which could have a negative economic impact on the informal collectors. However, if waste pickers are formally integrated into the LGUs' SWM system, their income should improve. With EPR, informal sector opportunities should increase as SUPs that previously had no value, would now have value as their recovery is required.

Plastic Value Chain	Stakeholders	Milestones	Roadmap Impact
Recovery and Recycling	Educators and Researchers	**M2.3:** Increases the quality of the plastic recyclates produced	**Outcome 2.** Policies promoting recycling should increase the quality of recycling, and decrease the dependency on imported plastic resins.
	Waste Management and Recycling Operators	**M1.2, M2.3, M1.5, and M3.3:** Increase technical and financial capacity and know-how	**Outcome 2.** New and improved recycling technologies should increase the quality of recyclables and the efficiency and performance of recyclers. New policies to improve recycling standards will require building the capacity of human resources, improving technologies, and so on.
Disposal	Waste Management and Recycling Operators	**M1.2 and M3.2:** Improve the standards for the design and construction of SLFs and their efficiency	**Outcome 3.** Following non-recyclable SUPs' reduction, the performance and efficiency of SLFs' O&M in carrying out the final disposal of plastics and other solid waste should improve.

5.6 Roadmap – Funding Sources

The availability of adequate funds is crucial for ensuring the successful implementation of the Roadmap. The initial key Actions include audits and surveys to quantify the funding gaps. Traditionally, the funding for plastic waste management initiatives in the Philippines has come from the national government and the LGUs' budgets, and this includes the annual General Appropriations Act (GAA), the LGU General Fund, the National Solid Waste Management Fund (NSWMF), and local Solid Waste Management Funds. International development agency projects also finance SWM initiatives by supplementing the government's resources. The environmental and SWM fees levied on residents, industries, and businesses provide sources of funding, too, for plastic and solid waste management.

By applying the *Polluters Pay Principle*, such as EPR, the government can create a funding mechanism that holds producers financially responsible for the management of their products' waste. This approach shifts the financial burden for plastic waste management to the producers, and it encourages them to adopt sustainable practices by redesigning their products for reuse and recyclability. The implementation of the new EPR Law's IRR introduces a comprehensive and sustainable approach for funding plastic waste management in the Philippines. This is because EPR funds are specifically earmarked for waste management activities, including infrastructure development, material recovery facilities, recycling facilities, awareness campaigns, and stakeholder engagement. The combination of all of these funds and fees, and the very strong public-private partnership framework in the Philippines should facilitate private sector participation through co-financing and contributing additional skills for carrying out plastic waste management.

The Roadmap primarily focuses on highly urbanized cities and municipalities. As noted previously, the key municipalities in Metro Manila have the necessary resources to implement the recommended improvements in solid and plastic waste management, and they also have the capacity to access additional financial resources from private businesses and industry.

The key financial resources and instruments available for plastic waste management are as follows:

Annual General Appropriations Act (GAA)

The funds appropriated to finance government programs and projects under the annual General Appropriations Act (GAA) come from the General Fund, which comprises all of the government's revenue and income. The GAA is an annual authorization from the Philippine Congress, which, in a given year, provides dedicated appropriations for salaries, wages, and other personnel benefits; maintenance and other operating expenses; and capital outlays for the implementation of all programs, projects, and activities in government departments, bureaus, and offices. To prepare for the GAA, all government agencies provide estimates for their expenditures to submit to Congress. For example, the National Ecology Center (NEC) and the DENR-EMB are both mandated under the EPR Law to include the sums necessary for the effective implementation of the law in the annual budget that they submit for financing under the GAA.

LGU General Fund

At the local level, the LGU General Fund finances the programs, projects, and other expenditures related to an LGU's mandate and functions, including SWM. This General Fund comprises an LGU's entire income from fees, charges, and other revenue sources, as well as the IRA from the national government. The amount is fixed at 40 percent of all of the national taxes collected in the three years prior to the current year. Under RA 7160 (1991), at least 20 percent of the IRA could be earmarked to finance development projects and activities, including SWM. An LGU can allocate the SWM budget from the General Fund, and 20 percent from the local development fund.

Similar to the national government, the LGUs must draft a multi-year, multi-sectoral development plan, which is called the Comprehensive Development Plan (CDP). The

The *Polluters Pay Principle* holds producers financially responsible for the management of their products' waste. This approach shifts the financial burden for plastic waste management to the producers, and encourages them to adopt sustainable practices by redesigning their products for reuse and recyclability.

CDP is implemented through an LGU's programs, projects, and activities (PPAs), which are prioritized under the Local Development Investment Program (LDIP). The LDIP reflects the prioritized PPAs that must be included in an LGU's Annual Investment Plan, and then reflected in the LGU's annual budget. In order to secure funding for their Actions in the Roadmap, the LGUs must include these in their LDIP.

The LGUs are allowed to incur debt under Section 296 of RA 7160 (1991), and avail themselves of credit facilities to finance local infrastructure and socio-economic projects, including SWM. This financing can come from government financial institutions (for example, the Land Bank of the Philippines, the Development Bank of the Philippines, and the Philippine National Bank); private financial institutions; and government lending programs managed by the Municipal Development Fund Office (MDFO). Under Section 324 of the Local Government Code, the ceiling for LGU borrowing is set to allow an appropriation for servicing debt that amounts to 20 percent of an LGU's regular annual income.

Multilateral and Bilateral Funds

Multilateral financial institutions (for example, the Asian Development Bank [ADB], the World Bank, and the International Finance Corporation [IFC]) and bilateral funding agencies (for example, the Japan International Cooperation Agency [JICA], Kreditanstalt für Wiederaufbau [KfW], the United States Agency for International Development [USAID], and Australian Aid) are major sources of financing for the infrastructure projects of both the national and local governments, and for various NGOs. These multilateral and bilateral funding agencies can also provide Philippine government financial institutions and the MDFO with concessional long-term funds for lending to the LGUs.

Public-private Partnerships

A public-private partnership (PPP) can be used to finance government services, including SWM. The Roadmap's implementing agencies can set up a PPP, and especially one for capital intensive activities. The selection of the modality ranges from schemes authorized under the Build-Operate-Transfer Law (RA 6957 of 1990), which was amended by RA 7718 of 1994, to joint-venture arrangements. This is allowed under the Local Government Code, as well as other private sector-funded arrangements.

National Solid Waste Management Fund

Although the National Solid Waste Management Fund (NSWMF) is still not operational (mid-2023), RA 9003 of 2000 authorized the fund's establishment as a special account in the National Treasury, which is to be administered by the National Solid Waste Management Commission. The possible sources of financing for the NSWMF include: (i) donations, endowments, grants, and contributions from domestic and foreign sources; (ii) amounts specifically appropriated for the fund under the annual General Appropriations Act; and (iii) fines collected under RA 9003, which are based on a sharing agreement between the NSWMF and the LGUs. However, the NSWMF will not include the fees collected through implementation of the EPR Law.

Local Solid Waste Management Funds

The IRR of RA 9003 (2000) authorizes the barangays to set up a local SWM Fund, which can be financed from: (i) donations, endowments, grants, and contributions from domestic and foreign sources; (ii) the LGU's share of the fines it collects; (iii) fees collected by the LGU for providing solid waste services, such as collecting, recycling, and transporting waste; (iv) sub-contracting fees, including those for waste management, transport, and so on; and (v) allocation from the 20 percent of the Local Development Fund.

Both national and local funds can be used to support SWM endeavors that enhance the implementation of RA 9003. This includes (i) products, facilities, technologies, and processes that enhance effective SWM; (ii) awards; (iii) incentives; (iv) research programs; (v) information, education, and communication campaigns, and monitoring activities; (vi) technical assistance; and (vii) capacity-building activities.

Table 5.5 presents potential funding and financing options for implementing the Roadmap. The key agencies listed would identify potential sources of funding within their agency that could be used to fill the identified financing gaps.

Funding should become progressively more available through the implementation of the EPR Law, and the establishment of public-private partnerships for SWM projects. In addition to the LGU General Fund, the source of funds for SWM projects will primarily be loans from financial institutions, and grants and concessional loans from international development agencies.

TABLE 5.5. POTENTIAL FUNDING AND FINANCING OPTIONS FOR IMPLEMENTING THE ROADMAP

Source	Features	Gaps	Viability
Public funding			
Annual GAA	Comprises appropriations for: salaries, wages, and other benefits for personnel; maintenance and other operating expenses; and capital outlays to fund implementation of the programs, projects, and activities in all of the government departments, bureaus, and offices for the given year	Total budget for each agency is limited	Primary source of funding
National and Local Solid Waste Management Funds	Supports national and local agencies' SWM activities	Few, to no resources, so currently this is not used	
LGU General Fund	Comprises all of the income from fees, charges, and other revenue sources, as well as the Internal Revenue Allotment (IRA)	No earmarking; allocation depends on the priorities of the LGU	
Financing and funding sources from the private sector			
Revenue generated from EPR	Through the EPR's RA 11898, Section 10, this supports the enterprises and PROs that are responsible for the EPR system's O&M	Not implemented yet (mid-2023)	Financing unlocked by meeting the Roadmap's Milestones
PPPs	Finance the implementation, development, and building of waste management systems and other infrastructure	Currently (mid-2023) not widely adopted; suitable enabling conditions need to be in place to bring in the private sector	
Loans from financial institutions	Land Bank of the Philippines (LBP), Development Bank of the Philippines (DBP), and Philippine National Bank (PNB) Multilateral financing institutions (for example, ADB, the World Bank, and IFC) and bilateral funding agencies (for example, JICA, KfW, USAID, and Australian Aid)	LGUs will need to repay these loans; proper cost-recovery mechanisms should be established beforehand	Additional financing/ funding sources
Official development assistance (ODA)	United Nations' organizations such as the United Nations Environment Programme and the United Nations Development Programme; JICA, WWF, the Global Environment Facility (GEF), GIZ, the Green Climate Fund (GCF), and so on	Dependent on third-party funding	

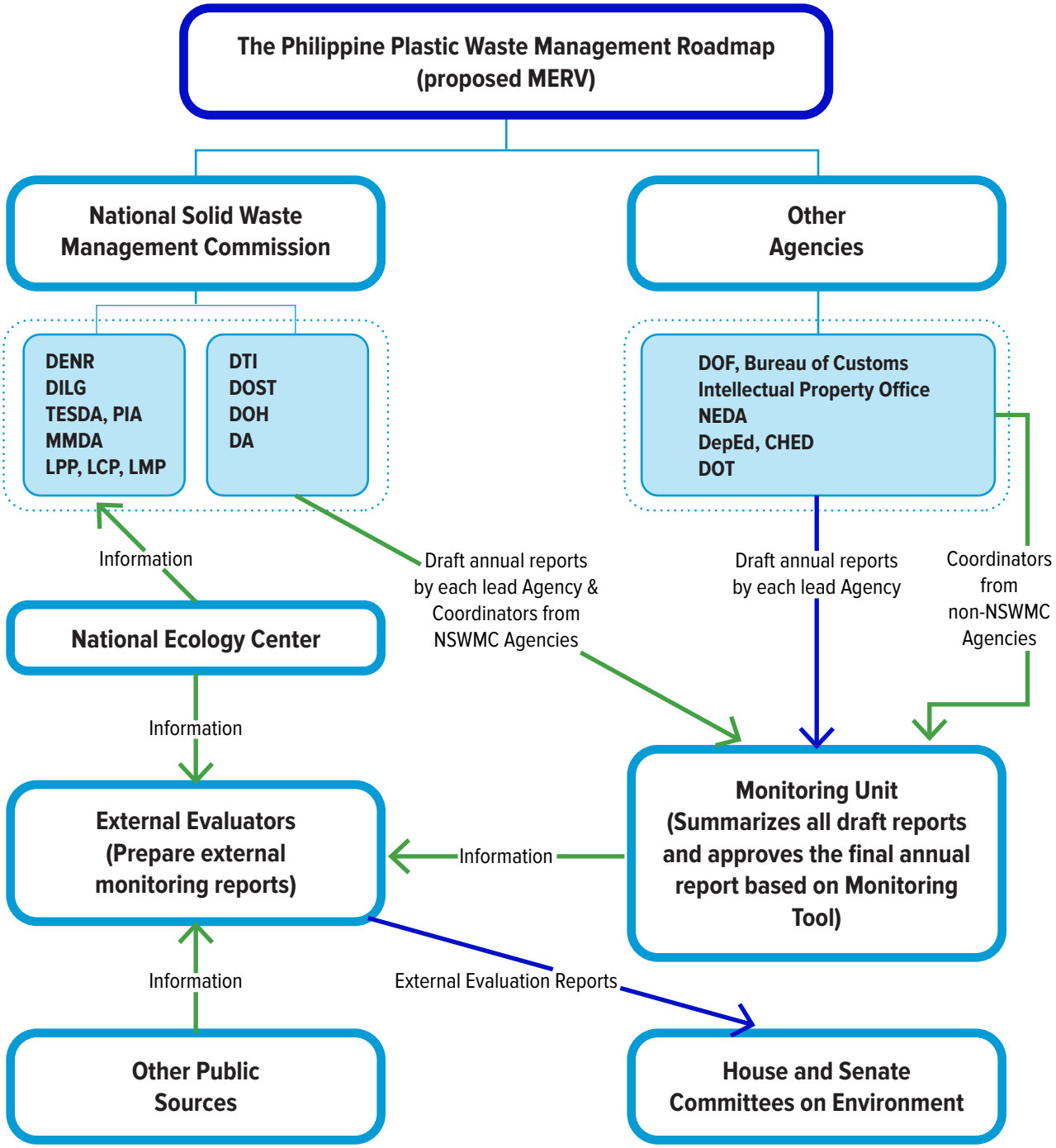
5.7 Roadmap Implementation: Monitoring, Evaluation, Reporting, and Verification

With the start of the Roadmap's implementation in 2023, a capacity development needs assessment should be performed by the key agencies involved in implementing the Roadmap to determine the gaps in knowledge and implementation skills. Based on this assessment, the responsible agencies (see Section 5.4 of the Roadmap – Institutional Set-up) would use internal and external resources to carry out the required capacity building. The efforts of these agencies would be supplemented once the National Ecology Center is fully operational. As indicated in the Roadmap, capacity building should continue throughout the Roadmap's implementation period, as this is crucial for the success of the Roadmap.

The Roadmap was designed to suit the current SWM and plastic waste conditions in the Philippines, which were assessed through consultation with stakeholders, and an assessment of the capacity of the key government agency stakeholders, the current financial conditions, and the current and proposed legal and regulatory framework with respect to plastic waste management. The proposed Actions in the Roadmap to support its Outcomes, which are measured by the Roadmap's Milestones, will transition over a reasonable period of time from simple Actions to complicated ones. Based on the analysis of current conditions, addressing the basic issues and barriers that affect waste collection, diversion, treatment, and disposal need to be prioritized to first reduce, and then eventually stop plastics' leakage into the environment.

Tracking and measurement of the achievements of the Roadmap, and assessment of the effectiveness of its implementation from 2023 to 2040, should use the monitoring and evaluation (M&E), and the reporting systems of the designated government agencies. This would be carried out through the agencies' annual reporting on their progress in implementing the Roadmap's Actions and achieving its Milestones. At the end of the Roadmap's short-term, medium-term, and long-term implementation timeline, external reviews should be carried out to verify government agencies' annual M&E and reporting. The Monitoring Framework is presented in Figure 5.8.

FIGURE 5.8. PROPOSED MONITORING, EVALUATION, REPORTING, AND VERIFICATION (MERV) FRAMEWORK – PHILIPPINE PLASTIC WASTE MANAGEMENT ROADMAP



Source: World Bank

Each government agency participating in the Roadmap should identify which of its units will be responsible for conducting M&E, and who will coordinate the unit and report the annual M&E results to the NSWMC so that it can carry out an evaluation. The NSWMC, in consultation with its participating agencies, could consider other parameters, too, for assessing the Roadmap's results, which would be based on the goals and timelines indicated in the Roadmap.

As noted above, external reviews should be performed by an independent evaluator to verify accomplishment of the short-term, medium-term, and long-term goals of the Roadmap (see Annex E). Based on the results of the NSWMC evaluations, and those of the external reviewers, the Actions and corresponding Milestones in the Roadmap could be extended, modified, or stopped and replaced with more appropriate ones. The external evaluations are particularly important to ensure that the internal monitoring for the Roadmap is high quality. Annex E provides recommendations on how to conduct the external evaluations.

The implementation of the Roadmap could face some challenges, and the measures for mitigating these are:

1. *Difficulties in attaining the 2040 goal of Zero Plastic Waste Pollution:* The Roadmap aligns with the Strategies, Actions, and Milestones of the National Plan of Action for the Prevention, Reduction, and Management of Marine Litter (NPOA-ML) (see Figure 3.3). The Roadmap is also based on the assumption that best international practices suited to conditions in the Philippines have been, and will be widely adopted.

2. *Problems sourcing and mobilizing adequate funding:* Funding from public and private sources has been identified. Legislation to allow the inclusion of SWM programs in the national budget could also be proposed (see Section 5.6).

3. *The Roadmap's Actions are too ambitious, given the current state of SWM in the Philippines, which is little plastic circularity and booming plastic demand:* The Roadmap is designed to ensure that its Actions are implemented in phases. For example, Actions to improve waste collection systems and recycling markets (M2.2) would be carried out before more ambitious Actions such adopting eco-design measures (M3.1).

4. *Lack of collaboration across government agencies:* To develop their sense of ownership, government agencies were consulted and involved in preparing the Roadmap (see Section 5.5 and Annex D). The proposed institutional framework (see Section 5.4) clearly identifies the lead and supporting agencies, and their specific roles.

5. *Problems sustaining the participation and cooperation of key stakeholders:* As this is a key success factor to ensure the Roadmap's proper implementation, its Stakeholders' Engagement Plan is designed to incorporate all of the relevant stakeholders in the Roadmap's implementation phases (see Section 5.5 and Annex D). These implementation phases are supported by information, education, and communication campaigns to raise awareness about plastic waste pollution, alternatives to SUPs, and the legal and regulatory framework for plastics and SWM.

6. *Too long an implementation period for the Roadmap:* By design, the Roadmap extends until 2040 to allow enough time to implement the Actions and reach the Milestones. As implementation could be affected for various reasons, including changes in the participating agencies and stakeholders, to address this challenge, regular reviews of the Monitoring Framework will be carried out until 2040.

5.8 Strategic Alignment with On-going Efforts to Improve Plastic Waste Management

The Philippines has initiated a number of complementary strategies to tackle plastic waste and solid waste management (see Figure 3.4). Each strategy provides a different part of the solution for achieving effective plastic waste management. Given the severity and the complexity of the issue, any potential duplication of efforts in the strategies should be viewed as necessary to reinforce the Roadmap's Actions. With RA 9003 as the umbrella legislation for plastic waste management, and the DENR ensuring the act's implementation, the other strategies should ensure a synergistic approach to plastic waste management. The proposed Roadmap aligns with the timeline for implementing the current legislation and strategies, and it will focus on harmonizing the government's strategies, clarifying the roles of the participating agencies, streamlining the Actions, and ensuring consistent and effective implementation to achieve the goal of Zero Plastic Waste Pollution by 2040.

As noted previously, the proposed Actions of the Roadmap align with the NPOA-ML's 10 strategic actions to progressively restrict specific SUPs and mainstream sustainable consumption and production initiatives (see Figure 3.3). Thus, the Roadmap supports a shift toward the Circular Economy. The Philippine Action Plan for Sustainable Consumption and Production (PAP4SCP) also includes actions for developing waste minimization policies, and it provides a plan to reduce non-recyclable SUP packaging in the short term.

Actions in the Roadmap contribute as well to achieving the development outcomes in the Philippine Development Plan 2023–2028. These comprise improving environmental quality by broadening waste minimization initiatives, increasing access to proper waste disposal facilities, and addressing the capacity constraints at the local level that continue to impede effective solid waste management.

The Green and Sustainable Packaging Science and Technology Roadmap prepared by the Packaging Technology Division of the DOST Industrial Technology

Development Institute (PTD-ITDI) targets developing policy measures and regulations for using recycled packaging, and achieving the effective disposal of plastic packaging by 2029. The PTD roadmap also plans to establish standards for plastic and bioplastic recycling.

Private sector involvement in waste management, in general, and in plastic reduction, in particular, is one of the Actions under the Roadmap. This aligns with the NPOA-ML's Strategic Action S2—Mainstream Circular Economy and Sustainable Consumption and Production Initiatives.

Actions in the Roadmap to increase the quality of recyclates and sorted waste, boost the demand for recyclates, and improve the technical capacity of the LGUs to produce quality recyclates, align with the NPOA-ML's Strategic Action S2—Mainstream Circular Economy and Sustainable Consumption and Production Initiatives, as well as with the system-changing strategies of the Zero Waste to Nature (ZWTN) 2030 Roadmap of PARMS. The latter's strategies are intended to drive market demand and the uptake of products from waste, as well as facilitate partnerships and collaborations that bring together private investors, LGUs, and local stakeholders to enter new ventures for developing waste diversion infrastructure.

Research and innovation on eco-design and alternatives to SUPs align with the NPOA-ML's Strategic Action S1—Establish Science- and Evidence-based Information on Marine Litter, and with NEDA's Philippine Action Plan for Sustainable Production and Consumption (PAP4SCP), which states "Strengthen research and innovation towards SCP and develop prototype green technologies." In addition, the PAP4SCP's identification, prioritization, and adoption of eco-design principles align with the NPOA-ML's Strategic Action S2—Mainstream Circular Economy and Sustainable Consumption and Production Initiatives.

Enabling sufficient, cost-effective financing and other institutional resource requirements under the Roadmap support the implementation of the NPOA-ML's Strategic Action S10—Strengthen LGUs' Capacities and Local-level Implementation of [the] NPOA-ML. Strengthening the institutional set-up for waste management in the LGUs also aligns with the NPOA-ML's Strategic Action S9—Enable Sufficient and Cost-Effective Financing and Other Institutional Resource Requirements to Implement [the] NPOA-ML.

In addition, the Roadmap aligns with the Sustainable S&T Solid Waste Management Roadmap of the Philippines Council for Industry, Energy, and Emerging Technology Research and Development (PCIEERD) under the heading, Human Resources "Upgrading of capacities/capabilities of institutions for sustainable SWM." Similarly, the Metropolitan Manila Development Authority (MMDA) 25-Year SWM Master Plan includes the formulation of ordinances to support improving organizational structures and plans, and it provides an introductory course and the roll-out of a new SWM Monitoring and Information System, which the LGUs can adopt.

The Roadmap's Actions to improve the systematic collection of data on waste management and make these data publicly available, align with three NPOA-ML Strategic Actions: S2—Mainstream Circular Economy and Sustainable Consumption and Production Initiatives, S3—Enhance Recovery and Recycling Coverage and Markets, and S4—Prevent Leakage From Collected or Disposed Waste. The Roadmap's information exchanges on recycling and waste management also align with the NPOA-ML's Strategic Action S3.

Roadmap Actions to enforce and implement the EPR Law are consistent with the law's provisions, the NPOA-ML's Strategic Action S2—Mainstream Circular Economy and Sustainable Consumption and Production Initiatives, and NEDA's Philippine Action Plan for Sustainable Production and Consumption (PAP4SCP), which, in the medium term (2022–2030), is intended to institutionalize *the Polluter Pays Principle* for consumers, and EPR for manufacturers.

The Roadmap's fund sourcing and financial management Actions align with the NPOA-ML's Strategic Action S9—Enable Sufficient and Cost-effective Financing and Other Institutional Resource Requirements for the Implementation of the NPOA-ML, and with the MMDA 25-Year SWM Master Plan, under the heading, Institutional Strengthening, which includes building capacity to conduct financial and economic analyses for proposed projects, as well as providing technical assistance for identifying sources of funding for SWM projects.

The Roadmap's Action to integrate the informal sector into the LGU SWM system aligns with two of the NPOA-ML's Strategic Actions: S2—Mainstream Circular Economy and Sustainable Consumption and Production Initiatives, and S4—Prevent Leakage From Collected or Disposed Waste.

The Roadmap's cross-cutting Actions, which contribute to increasing consumers' awareness about the need to separate their waste for collection, and on the adverse impacts of SUP littering, align with the NPOA-ML's Strategic Action S8—Developing and Implementing Strategic and Targeted Social Marketing and Communications Campaigns. The Roadmap's Action on developing a communication strategy (A3.3.1), and its High-level Action 3 (HLA3) on the Stakeholders' Engagement Plan, align with the major programs/projects of the MMDA 25-Year SWM Master Plan on preparation and training for stakeholder engagement, and capacity building through social and behavior change communication. Table 5.6 summarizes the different strategies just discussed, their leading agency, and their relevance to plastic waste management.

TABLE 5.6. THE MOST RELEVANT AND RECENT NATIONAL STRATEGIES EXPECTED TO IMPACT PLASTIC PRODUCTION, CONSUMPTION, AND DISPOSAL; THE LEADING AGENCY; AND THE IMPLEMENTATION TIMEFRAME

Title of the strategy	Leading agency	Contents	Timeframe
National Plan of Action for the Prevention, Reduction, and Management of Marine Litter (NPOA-ML)	Department of Environment and Natural Resources-Environmental Management Bureau (DENR-EMB)	Overarching goal, Zero Waste to Philippine Waters by 2040, through shared responsibility, accountability, and participatory governance.	2021–2040
Philippine Action Plan for Sustainable Consumption and Production (PAP4SCP)	National Economic and Development Authority (NEDA)	Strategies on Policy Regulation, Research and Development, Innovation and Technology, Infrastructure, and Promotion and Education, have been developed to increase the production and consumption of Green products: • Creation of business models for waste minimization and innovation hubs (2020–2022); • Institutionalization of EPR (2022–2030); and • Banning non-recyclable SUPs where viable alternatives exist (2022–2030).	2020–2040
Green and Sustainable Packaging Science and Technology Roadmap	Packaging Technology Division of the DOST Industrial Technology Development Institute (PTD-ITDI)	• Reduce the environmental impact of packaging materials; • Develop locally produced biodegradable and bioplastic packaging with improved properties; and • Establish circular system/technologies for three types of packaging.	2022–2032
Zero Waste to Nature (ZWTN) Roadmap	Philippine Alliance for Recycling and Materials Sustainability (PARMS)	Provides strategies for members, including those offering fast-moving consumer goods, to enable them to achieve zero industrial and post-consumer packaging waste in nature by 2030. Its three major strategies are: design for circularity, support for waste recovery facilities, and facilitation of investments in diversion pathways.	2021–2030
Sustainable S&T Solid Waste Management Roadmap	Philippine Council for Industry, Energy, and Emerging Technology Research and Development (PCIEERD)	Serves as the basis for the development and prioritization of new programs and projects to be included in the call for proposals related to solid waste management funding. The milestones set for 2026 are enhanced industry compliance with solid waste management policies/regulations, and the reduction and minimization of solid waste generation.	2022–2026
Philippine Development Plan (PDP)	National Economic and Development Authority (NEDA)	Targets by 2028 are: • 53 percent of barangays served by materials recovery facilities (MRFs); • 50 percent of cities/municipalities served by sanitary landfill facilities (SLFs); • 80 percent of plastic products' footprint recovered; and, • 5.40 $MtCO_2e$ greenhouse gas (GHG) emissions reduced from the waste sector.	2023–2028
Philippine Plastics Roadmap	Philippine Plastics Industry Association (PPIA), in partnership with the Department of Trade and Industry's Board of Investments (DTI-BOI)	Ensure the viability, sustainability, and competitiveness of the industry through the development and strengthening of the plastics' recycling industry. Targets for recovery and recycling are 20 percent by 2022, 60 percent by 2030, and improving employment in the recycling industry, including the marginalized sector (informal waste pickers).	2014–2030
25-Year SWM Master Plan	Metropolitan Manila Development Authority (MMDA)	Once the Master Plan has been agreed by the Metro Manila Council, a resolution to adopt 25-year plans and strategies will be developed and published. Some of the major programs/projects/activities under consideration are: • Facility-based Integrated SWM; • SWM Policy Development Program; • Stakeholder Engagement and Behavioral Change; and • Institutional Strengthening.	2022–2046

6. CONCLUSION

In conclusion, this report illustrates the urgent and substantial challenges posed by plastic waste in the Philippines, while also outlining the foundations for a Roadmap to manage, and to ultimately reduce non-recyclable single-use plastics in the country. The pervasiveness of plastic waste, which is fueled by significant consumption, ineffective waste management, and the public's general lack of environmental consciousness, underscores the need for immediate and strategic action. The legislation and sector strategies for plastic waste management in the Philippines, although commendable, fall short in effectively tackling the sheer volume of plastic waste, and the complex structural issues in waste management. Current government efforts comprise policies for waste segregation, initiatives for recycling, and local bans on single-use plastic products; however, these measures have been unevenly applied and insufficiently enforced, which has resulted in their limited success. The barriers impeding the further improvement of plastic waste management are multi-faceted, and range from institutional to socio-cultural ones. There is obvious lack of coordination among the various stakeholders, insufficient infrastructure, and lack of public awareness regarding plastic waste issues. Moreover, the systemic issues in waste management and the informal sector's role in waste collection and recycling add more layers of complexity to the situation.

To address these challenges, the Roadmap presented in this report provides a comprehensive, phased, and long-term approach to manage plastic waste and reduction of non-recyclable single-use plastics. The goal of achieving *Zero Plastic Waste Pollution by 2040* might seem ambitious, however, it is feasible and necessary given the scale of the Philippines' plastic waste problem. The proposed Roadmap provides a strategic plan that is built on three significant Outcomes, it is supported by a number of practical Actions, and these are measured by time-bound Milestones:

- The Actions to achieve the First Outcome, *Plastic Leakage Pathways Closed*, over the period from 2023 to 2028, target improving waste collection, segregation, and disposal; and reducing the amount of plastic that enters natural ecosystems, and especially the ocean. By upgrading waste management infrastructure, and carrying out stricter regulation, this phase should establish the groundwork for the succeeding steps in the Roadmap.
- The Actions to achieve the Second Outcome, *Plastic Recycling Enabled*, over the period from 2023 to 2034, requires investments in recycling technologies, training programs, and incentives to encourage more significant participation in recycling efforts. The vision here is to transform waste into resources, and foster a Circular Economy.
- The Actions to achieve the Third Outcome, *Demand for Plastics Managed and Products Designed for Circularity*, over the period from 2023 to 2040, focus on reducing the production and consumption of plastics, and particularly single-use items. This outcome necessitates public education campaigns, legislation to restrict single-use plastics, and the promotion of alternatives to plastics.

To sum up, while the task of managing plastic waste and reduction of non-recyclable single-use plastics in the Philippines is a daunting one, it is far from impossible. This Roadmap, which presents a comprehensive plan with a clear Goal, Actions, Milestones, and Outcomes, requires the collaboration of all of the concerned stakeholders—national government agencies, local governments, the private sector, informal workers, NGOs, and consumers. If all of these stakeholders embrace the Roadmap, wholeheartedly, it should provide powerful guidance for achieving a future that is free from plastic waste pollution.

BIBLIOGRAPHY

Akenji, Lewis, Magnus Bengtsson, Mizuki Kato, Matthew Hengesbaugh, Yasuhiko Hotta, Chika Aoki-Suzuki, Premakumara Jagath Dickella Gamaralalage, and Chen Liu. 2019. *Circular Economy and Plastics: A Gap-Analysis in ASEAN Member States*. Policy Report. Jakarta: Mission of the European Union to ASEAN and the ASEAN Secretariat. https://www.iges.or.jp/en/pub/ce-plastics/en.

Akyra Hotels. "First No Single-Use Plastic Hotel Launch in Asia." August 2021. Bangkok: Akyra Hotel Group. https://www.theakyra.com/blog/first-no-single-use-plastic-hotel-launch-asia/.

Ang, Rodolfo P. and Joseph Sy-Changco. 2007. "The Phenomenon of Sachet Marketing: Lessons to be Learned from the Philippines." *Enhancing Knowledge Development in Marketing*, Volume 5. https://archium.ateneo.edu/gsb-pubs/6/

APCO (Australian Packaging Covenant Organisation). n.d. APCO website. https://apco.org.au/

Arayata, Ma. Cristina. 2021. "Biodegradable plastic manufacturer gets P3-M loan from DOST." *Philippine News Agency*. November 15, 2021. https://www.pna.gov.ph/articles/1159838

ASEAN (Association of Southeast Asian Nations). 2021. *ASEAN Regional Action Plan for Combating Marine Debris in the ASEAN Member States (2021-2025)*. Jakarta: The ASEAN Secretariat. https://asean.org/book/asean-regional-action-plan-for-combating-marine-debris-in-the-asean-member-states-2021-2025-2/

ADB (Asian Development Bank). 2018. *Solid Waste Management in the Pacific: Philippines Country Snapshot*. Manila: ADB.

_____. 2017. "Quezon City: Making Waste Management a Rewarding Investment." Case Study. Manila: ADB. https://www.adb.org/sites/default/files/institutional-document/324101/tool-kit-solid-waste-management.pdf.

Arri, Delphine and Grzegorz Peszko. 2022 "Where Is the Value in the Chain?: Pathways out of Plastic Pollution." Washington, DC: World Bank Group. https://openknowledge.worldbank.org/server/api/core/bitstreams/d728bd11-b14e-513f-be06-aeb-c15f10ebf/content

Beitien, Stefanie. 2020. "How to establish sectoral collaboration for reducing plastic pollution in food delivery and takeaway – the example of WWF's PACT in Singapore." *Reducing Single-Use Plastics in Food Delivery and Takeaway.* Documentation of the webinar on 30 July 2020, with experiences and best practices from Europe and East- and Southeast Asia. Bonn: Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH and Expertise France. https://www.thai-german-cooperation.info/wp-content/uploads/2020/09/Full-documentation-webinar-30-July.pdf

Berkeley Municipal Code. n.d. "Single Use Foodware and Litter Reduction, Ch.11.64." Berkeley: City of Berkeley. https://berkeley.municipal.codes/BMC/11.64.010

Berners-Lee, Mike. 2011. *How Bad Are Bananas?: The Carbon Footprint of Everything*. Vancouver: Greystone Books.

Biona, Jose Bienvenido Manuel M., Jeremias A. Gonzaga, Aristotle T. Ubando, and Hazel Claire Tan. 2015. "A Comparative Life Cycle Analysis of Plastic and Paper Packaging Bags in the Philippines." *8th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment and Management (HNICEM)*. Cebu City: IEEEXplore. https://ieeexplore.ieee.org/document/7393237

BMK (Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation, and Technology, Austria). n.d. "Electronic Data Management." Vienna: BMK. https://secure.umweltbundesamt.at/edm_portal/home.do?loggedOut=&ubastyle_lang=en.

Bondoc, Adina Faye, Hannah Felise Florendo, Emilio Jefe Taguiwalo, and John Emilio Jefe. 2019. "Life in the Fast Food Lane: Understanding the Factors Affecting Fast Food Consumption among Students in the Philippines." *The Philippine Statistician*, Volume 8, Issue 1: 75–101. https://www.psai.ph/docs/publications/tps/tps_2019_68_1_5.pdf

Bottle Bill Resource Guide. 2019. "South Korea." *Bottle Bill Resource Guide*. https://www.bottlebill.org/index.php/current-and-proposed-laws/worldwide/south-korea.

Brunhuber, Kim. 2019. "It's a good start': Berkeley Takes the Lead in Charging Fee for Single Use Cups." *CBC News*. December 27, 2021. https://www.cbc.ca/news/world/berkeley-businesses-single-use-to-go-coffee-cups-fee-1.5395807

Bündnis Entiwcklung Hilft. n.d. "World Risk Index 2018." https://weltrisikobericht.de/english-2/

CGTN (China Global Television Network). 2020. "McDonald's in China will phase out plastic straws." *CGTN*. June 30, 2020. https://news.cgtn.com/news/2020-06-30/McDonald-s-in-China-will-phase-out-plastic-straws-RKgi6XLUyI/index.html

Chankaew, Prapan. 2020. "Thailand kicks off 2020 with plastic bag ban." *Reuters*. January 1, 2020. https://www.straitstimes.com/asia/se-asia/thailand-kicks-off-2020-with-plastic-bag-ban

CNN Philippines. 2021. "Year One of Plastic Neutrality: Nestlé PH Recovers 27,000 Tons of Waste." *CNN Philippines*. September 13, 2021. https://www.cnnphilippines.com/lifestyle/2021/9/13/Year-one-of-plastic-neutrality--Nestl--PH-recovers-27-000-tons-of-waste.html

Coordinating Body on the Seas of East Asia & Commonwealth Scientific and Industrial Research Organisation. 2022. *Regional Guidance on Harmonized National Marine Litter Monitoring Programmes: Monitoring Efforts and Recommendations for National Marine Litter Monitoring Programmes*. Bangkok: United Nations Environment Programme. https://www.unep.org/cobsea/resources/toolkits-manuals-and-guides/regional-guidance-harmonized-national-marine-litter

Cointreau-Levine, Sandra and Adrian Coad. 2020. *Guidance Pack: Private Sector Participation in Municipal Solid Waste*. St. Gallen: SKAT Swiss Centre for Development Cooperation in Technology and Management. https://www.eawag.ch/fileadmin/Domain1/Abteilungen/sandec/E-Learning/Moocs/Solid_Waste/W2/Guidance_pack_Private_sector_2000.pdf

Delima, Alexandra, Ella Jane Staines, Kristine Joy Tuliao, Rhea Angeline Mata, and Kimberly Joyce Borja Embile. 2020. "Effects of Using Bamboo Stick Straw on Grade 12 ABM Strand Students at Bestlink College of the Philippines." *Ascendens Asia Singapore – Bestlink College of the Philippines Journal of Multidisciplinary Research*, Volume 2, Issue 1. https://ojs.aaresearchindex.com/index.php/aasgbcpjmra/article/view/2579

DENR (Environmental Management Bureau-Department of Environment and Natural Resources, Philippines). 2018. *National Solid Waste Management Report 2008–2018*. Quezon City: DENR. https://eeid.emb.gov.ph/wp-content/uploads/2020/07/SOLIDWASTE-LAYOUT_final.pdf

_____. 2021. *Philippines National Plan of Action for the Prevention, Reduction and Management of Marine Litter*. Quezon City:

DENR. https://seaknowledgebank.net/sites/default/files/Jan%202022%20Final%20Philippines%20NPOA-ML%20(1).pdf

Dinglasan, Juan Miguel. 2019. "Sustainable Biodegradable Plastic Packaging Material for the Philippines." *Ascendens Asia Journal of Multidisciplinary (AAJMRCP) Research Abstracts*, Volume 3, Issue 3. https://ojs.aaresearchindex.com/index.php/aajmrcp/article/view/738

EcoWaste Coalition of the Philippines and De La Salle University-Dasmariñas. 2021. "Assessment of Plastic Pollution Along Manila Bay: Solid Waste Collection Efficiency Assessment of Selected Local Government Units Along Manila Bay: EcoWaste Coalition. https://www.dlsud.edu.ph/sustain/news/2021/eco.htm

Edwards, Chris and Jonna Meyhoff Fry. 2011. *Life Cycle Assessment of Supermarket Carrier Bags: A Review of the Bags Available in 2006*. Bristol: Environment Agency. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/291023/scho0711buan-e-e.pdf

Ellen MacArthur Foundation. n.d. "The Plastics Pact Network." https://ellenmacarthurfoundation.org/the-plastics-pact-network.

European Commission. 2003. *Guidelines for Successful Public-Private Partnerships*. February 2003. Brussels: European Commission. https://ec.europa.eu/regional_policy/sources/docgener/guides/ppp_en.pdf.

_____. 2016. *Ecodesign Working Plan 2016-2019*. November 2016. Brussels: European Commission. https://ec.europa.eu/transparency/documents-register/api/files/COM(2016)773_0/de00000000302041?rendition=false

Faraj, Dina, and Saad Shihab. 2019. "How can Beema Bamboo Plantations Benefit Islands and Farmers in the Philippines? A study in Manila, Marinduque and Romblon, the Philippines." MG110X Degree Project in Industrial Production. Stockholm: KTH Royal Institute of Technology. http://www.diva-portal.org/smash/get/diva2:1374150/FULLTEXT01.pdf

Fotiou, Stefanos, Alexander Lee-Emery, Sonia Dias, and Taylor Cass-Talbott. 2021. "10 Principles to Create Inclusive Waste Management Systems and Reduce Marine Plastic Pollution." July 19, 2021. Bangkok: United Nations Economic and Social Commission for Asia and the Pacific. https://www.unescap.org/blog/10-principles-create-inclusive-waste-management-systems-and-reduce-marine-plastic-pollution.

GAIA (Global Alliance for Incinerator Alternatives). 2019. *Plastics Exposed: How Waste Assessments and Brand Audits are Helping Philippine Cities Fight Plastic Pollution*. Quezon City: Global Alliance for Incinerator Alternatives. https://www.no-burn.org/plastics-exposed-how-waste-assessments-and-brand-audits-are-helping-philippine-cities-fight-plastic-pollution/

_____. 2020. *Regulating Single-use Plastics in the Philippines. Opportunities to Move Forward*. Quezon City: Global Alliance for Incinerator Alternatives. https://www.no-burn.org/Policy-BriefSUP2020/

Gallego-Schmid, Alejandro, Joan Manuel F Mendoza, and Adisa Azapagic. 2019. "Environmental Impacts of Takeaway Food Containers." *Journal of Cleaner Production* Volume 211: 417–427. https://www.sciencedirect.com/science/article/pii/S0959652618336230

Garcia, Ves. 2019. "Siargao Cafe Uses Eco-friendly 'Lukay' Straws Made of Coconut Leaves." *Lifestyle Inquirer*. April 26, 2019. https://lifestyle.inquirer.net/333115/siargao-cafe-uses-eco-friendly-lukay-straws- coconut-fronds/

GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH). 2018. *Inclusion of Informal Collectors into the Evolving Waste Management System in Serbia*. Bonn: GIZ https://www.giz.de/de/downloads/inclusion-of-informal-collectors-into-the-evolving-waste-management.pdf

Goulopoulos, Sophie. 2019. "Bali Officially Bans All Single-use Plastic to Curb Ocean Pollution." *New York Post*. July 2, 2019. https://nypost.com/2019/07/02/bali-officially-bans-all-single-use-plastic-to-curb-ocean-pollution/

Government of Canada. 2021. "Guidance for Selecting Alternatives to the Single-use Plastics in the Proposed Single-use Plastics Prohibition Regulations." December 2021. Gatineau: Environment and Climate Change Canada. https://www.canada.ca/en/environment-climate-change/services/managing-reducing-waste/consultations/proposed-single-use-plastics-prohibition-regulations-consultation-document.html

Heo, Hyein, and Mun-hee Jung. 2014. "Case Study for OECD Project on Extended Producer Responsibility Republic of Korea." *Extended Producer Responsibility: Updated Guidance for Efficient Waste Management*. Paris: Organisation for Economic Co-operation and Development. https://www.oecd.org/environment/waste/OECD_EPR_case_study_Korea_revised_140522.pdf.

Jangprajak, Wassana. 2021. "National Action Plan on Plastic Waste Management in Thailand." Bangkok: Pollution Control Department, Ministry of Natural Resources and Environment. https://www.iges.or.jp/sites/default/files/inline-files/S1-5_PPT_Thailand%20Plastic%20Action%20Plan.pdf

Kariuki, R. Mukami, and Christopher Rey Ancheta. 2008. *Cost Sharing Framework for Solid Waste Management*. Manila: World Bank Philippines. https://www.scribd.com/document/499139938/Cost-Sharing-Framework-for-Swm

Kong, Ying Xuan. 2019. "Gojek Leads the Charge on Disposable Cutlery for Online Deliveries in Indonesia." *Eco-Business*. July 24, 2019. https://www.eco-business.com/news/gojek-leads-the-charge-on-disposable-cutlery-for-online-deliveries-in-indonesia/

Kultura. 2021. "Advocacy." Website accessed August 14, 2023. https://www.kulturafilipino.com/pages/advocacy

Lebreton, Laurent C. M., Joost van der Zwet, Jan-Willem Damsteeg, Boyan Slat, Anthony Andrady, and Julia Reisser. 2017. "River Plastic Emissions to the World's Oceans." *Nature Communications*, Volume 8, Issue 1. https://www.nature.com/articles/ncomms15611

McIntyre, Andrew. 2017. "Waste Management in Asia: 1 Goal, 5 Cities, 5 Lessons." *Blog*. June 23, 2017. Asian Development Bank. https://blogs.adb.org/blog/waste-management-asia-1-goal-5-cities-5-lessons

Manala-O, Safa and Patrick Aure. 2019. "Food Waste Behavior of Young Fast-food Consumers in the Philippines." *Asia-Pacific Social Science Review*, Volume 19, Issue 3: 72–87. https://www.researchgate.net/publication/336675631_Food_Waste_Behavior_of_Young_Fast-food_Consumers_in_the_Philippines

Marsh. 2019. *Political Risk Map 2019: Rising Geopolitical Tensions*. New York: Marsh. https://www.marsh.com/uk/insights/research/political-risk-map-2019.html.

Marriott International. 2019. "Marriott International to Eliminate Single-Use Shower Toiletry Bottles from Properties Worldwide, Expanding Successful 2018 Initiative." *Press Release*. August 28, 2021. Bethesda: Marriott International. https://news.marriott.com/news/2019/08/28/marriott-international-to-eliminate-single-use-shower-toiletry-bottles-from-properties-worldwide-expanding-successful-2018-initiative

Mathur, Barkha. 2020. "Plastic Crisis: China Plans To Eliminate Single-Use Plastic Bag And Other Items By 2025." *NDTV*. January 23, 2020.

https://swachhindia.ndtv.com/plastic-crisis-china-plans-to-eliminate-single-use-plastic-bag-and-other-items-by-2025-41832/

Meijer, Lourens J. J., Tim van Emmerik, Rudd van der Ent, Christian Schmidt, and Laurent Lebreton. 2021. "More than 1000 Rivers Account for 80% of Global Riverine Plastic Emissions into the Ocean." *Science Advances*, Volume 7, Issue 18. https://www.science.org/doi/10.1126/sciadv.aaz5803

Mest, Elliott. 2018. "Hilton aims to cut environmental impact in half by 2030." *Hotel Management*. May 23, 2018. https://www.hotelmanagement.net/operate/hilton-to-cut-environmental-impact-half-by-2030.

MESTECC (Ministry of Energy, Science, Technology, Environment & Climate Change, Malaysia). 2018. *Malaysia's Roadmap towards Zero Single-Use Plastics 2018-2030*. Putrajaya: MESTECC. https://www.moe.gov.my/images/KPM/UKK/2019/06_Jun/Malaysia-Roadmap-Towards-Zero-Single-Use-Plastics-2018-2030.pdf

Ministry of Commerce, National Development and Reform Commission, and State Administration for Industry and Commerce, China. 2008. "State Administration for Industry and Commerce Order No. 8: Administrative Measures for the Compensated Use of Plastic Shopping Bags at Commodity Retailing Places." https://nicholasinstitute.duke.edu/sites/default/files/plastics-policies/1023_N_2007_Administrative_Measures_for_the.pdf

Ministry of Economy and Finance, Peru. 2018. Decreto Supremo que aprueba la reducción del plástico de un solo uso y promueve el consumo responsable del plástico en las entidades del Poder Ejecutivo.» (Supreme Decree No. 013-2018-MINAM — Approves the reduction of single-use plastic and promotes the responsible consumption of plastic in the entities of the Executive Power). https://gobpe-production.s3.amazonaws.com/uploads/document/file/219245/ds_013-2018-MINAM.pdf.

Ministry of Environment and Forestry, Indonesia. 2019. "Ministry of Environment and Forestry Regulation 75/2019 on Roadmap of Waste Reduction by Producers." https://amcham.us12.list-manage.com/track/click?u=3952d41620b893439c9090d05&id=c20055af74&e=a45a5adaaf

Ministry of Environment, Forest, and Climate Change, India. 2022. "Ban on single use plastics." March 21, 2022. https://moef.gov.in/en/ban-on-single-use-plastics/

Ministry of Environment, Water, and Climate, Zimbabwe. 2010. "Plastic Packaging and Plastic Bottles Regulation 2010, S.I. No. 98 of 2010." https://www.ecolex.org/details/legislation/plastic-packaging-and-plastic-bottles-regulation-2010-si-no-98-of-2010-lex-faoc171720/.

National Environment Agency, Singapore. 2022. "Waste Collection Systems - Waste Management." https://www.nea.gov.sg/our-services/waste-management/waste-collection-systems.

NEDA (National Economic and Development Authority). 2017. *Philippine Development Plan 2017–2022*. Pasig City: National Economic and Development Authority. https://pdp.neda.gov.ph/wp-content/uploads/2017/01/PDP-2017-2022-10-03-2017.pdf

_____. 2022. *Philippine Development Plan 2023–2028*. Pasig City: National Economic and Development Authority. https://pdp.neda.gov.ph/

Nestlé. 2021. "Year One of Plastic Neutrality: Recovering 27,000 Tons of Waste." *Nestlé Philippines*. August 10, 2021. https://www.nestle.com.ph/media/news/year-one-plastic-neutrality

NIVA (Norwegian Institute for Water Research). 2019. "ASEAN-Norwegian cooperation project on local capacity building for reducing plastic pollution in the ASEAN region (ASEANO)." May 12, 2019. https://www.niva.no/en/projectweb/aseano.

NSWMC (National Solid Waste Management Commission). n.d. "Operational Sanitary Landfill: Actual Waste Received (Tons Per Day) By Operator/Project Name". *Power BI.com* https://app.powerbi.com/view?r=eyJrIjoiMjE5OGY4MDQtMTkwYy00NGFiLWJjN-zAtNjc0MTRjNmZmMWYzIiwidCI6ImY2ZjRhNjkyLTQzYjMtND-MzYi05MmIyLTY1YzRlNmNjZDkyMCIsImMiOjEwfQ%3D%3D

_____. 2009. *National Framework Plan for the Informal Waste Sector in Solid Waste Management*. Quezon City: NSWMC.

_____. 2011. *National Solid Waste Management Strategy 2012-2016*. Quezon City: NSWMC.

_____. 2021. "Number of Materials Recovery Facilities." Quezon City: NSWMC. https://nswmc.emb.gov.ph/

_____. 2022a. "Solid Waste Generation." Quezon City: NSWMC. https://nswmc.emb.gov.ph/

_____. 2022b. "Recipients of SWM Equipment." Quezon City: NSWMC. https://nswmc.emb.gov.ph/

_____. 2022c. "Operational Sanitary Landfills." Quezon City: NSWMC. https://nswmc.emb.gov.ph/

Ocean Conservancy and McKinsey Center for Business and Environment. 2015. *Stemming the Tide: Land-based Strategies for a Plastic-free Ocean*. September 2015. Washington, DC: Ocean Conservancy. https://optoce.no/wp-content/uploads/2019/03/McKinsey-Stemming-the-tide-Land-based-strategies-for-a-plastic-free-ocean.pdf

OECD (Organisation for Economic Co-operation and Development). 2022. *Global Plastics Outlook Economic Drivers, Environmental Impacts and Policy Options*. Paris: OECD. https://www.oecd-ilibrary.org/environment/global-plastics-outlook_de747aef-en.

Paper Recycling Coalition. n.d. "How Recycling Paper Fights Global Warming." https://www.paperrecyclingcoalition.com/policy-issues/how-recycling-paper-fights-global-warming/

Paul, Johannes, Joan Jaque, Neil Ravena, and Salome P. Villamor. 2011. "Strategies to Enhance Livelihood as Precondition for Informal Sector Integration into the Municipal Waste Management Program at the Calahunan Dumpsite in Iloilo City, Philippines." *Proceedings of the International Conference SARDINIA, Cagliari, Italy.*

PACT (Plastic ACTion). n.d. "Plastic ACTion (PACT)." https://plastic-action.asia/

PCD (Pollution Control Department, Thailand). 2015. "Green Public Procurement in Thailand." Bangkok: Pollution Control Department, Ministry of Natural Resources and Environment. https://www.env.go.jp/policy/hozen/green/kokusai_platform/2015symposium/03Thailand.pdf

_____. 2019. *Thailand Plastic Waste Management Roadmap 2018-2030*. Bangkok: Pollution Control Department, Ministry of Natural Resources and Environment. https://www.pcd.go.th/wp-content/uploads/2021/10/pcdnew-2021-10-19_08-59-54_995414.pdf

Philippine Statistics Authority. 2021. "2020 Census of Population and Housing (2020 CPH) Population Counts Declared Official by the President." *Media Release*. July 7, 2021. https://psa.gov.ph/content/2020-census-population-and-housing-2020-cph-population-counts-declared-official-president

Plastic Bank. n.d. "Plastic Bank." https://plasticbank.com/

Platon, Catalina C., Rachel C. Pambid, and Evelyn Lomboy. 2017. "Food Safety Practices among Native Delicacy Producers and Vendors in the Public Market of Bayambang in Pangasinan." *Asia Pacific Journal of Education, Arts and Sciences* Volume 4, Issue 2:

85-102. http://apjeas.apjmr.com/wp-content/uploads/2017/10/APJEAS-2017.4.2.12a.pdf

PROBLUE (World Bank). n.d. "PROBLUE: Healthy Oceans, Healthy Economies, Healthy Communities." PROBLUE website. https://www.worldbank.org/en/programs/problue

Republic of the Philippines. 2000. Republic Act No. 9003: The Ecological Solid Waste Management Act of 2000. Metro Manila: Congress of the Philippines.

_____. 2022. Republic Act No.11898: The Extended Producer Responsibility Act of 2022. Metro Manila: Congress of the Philippines.

Ritchie, Hannah and Max Roser. 2018. "Plastic Pollution". *OurWorldInData.org.* Retrieved from: https://ourworldindata.org/plastic-pollution.

RiverRecycle. n.d. "PHILIPPINES: Pasig River cleanup." RiverRecycle website accessed August 12, 2023. https://www.riverrecycle.com/philippines-pasig-river-cleanup/

South African Waste Information Centre. n.d. "South African Waste Information Centre." http://sawic.environment.gov.za

Starbucks Corporation. 2018. "Starbucks to Eliminate Plastic Straws Globally by 2020." July 9, 2018. https://stories.starbucks.com/press/2018/starbucks-to-eliminate-plastic-straws-globally-by-2020/

Stinson, Liz. 2019. "New 'Zero-waste Platform' Sells Products in Reusable Stainless Steel Containers." *Curbed*. January 30, 2019. https://archive.curbed.com/2019/1/30/18201277/loop-zero-waste-platform-recycling

Sur, Mona, Junu Shresta, and Agnes Balota. 2023. "Addressing the plastic pollution crisis in the Philippines: New momentum." *World Bank Blogs*, March 16, 2023. https://blogs.worldbank.org/eastasiapacific/addressing-plastic-pollution-crisis-philippines-new-momentum?cid=SHR_BlogSiteEmail_EN_EXT

Tanaka, Julian. 2021. *Sachets at the Bottom of the Pyramid: Redesigning Laundry Detergent Sachet Packaging Systems for Impactful Reduction of Plastic Waste in the Philippines*. Master's Thesis submitted to Massey University, New Zealand. Palmerston North: Massey University. https://mro.massey.ac.nz/handle/10179/16759

Transparency International. 2018. "Corruption Perception Index." Berlin: Transparency International. https://www.transparency.de/cpi/cpi-2018/cpi-ranking-2018/

Tun-atiruj, Choltanutkun. 2018. "Foodpanda Now Lets You "Opt Out" of Plastic Cutlery." *BK Magazine*. June 5, 2018. https://bk.asia-city.com/city-living/news/foodpanda-to-give-you-option-to-opt-out-plastic-cutlery

UNEP (United Nations Environment Programme). 2018. *Single-Use Plastics. A Roadmap for Sustainability.* United Nations Environment Programme. Nairobi: UNEP. https://www.unep.org/resources/report/single-use-plastics-roadmap-sustainability

UNEP (United Nations Environment Programme), C. Excell, C. Salcedo-La Viña, and L Notess. 2020. *Tackling Plastic Pollution Legislative Guide for the Regulation of Single-Use Plastic Products.* Nairobi: UNEP. https://www.unep.org/resources/toolkits-manuals-and-guides/tackling-plastic-pollution-legislative-guide-regulation

UNEP (United Nations Environment Programme) and World Travel & Tourism Council. 2021. *Rethinking Single-Use Plastic Products in Travel & Tourism - Impacts, Management Practices and Recommendations.* June 2021. Nairobi: UNEP. https://wedocs.unep.org/bitstream/handle/20.500.11822/36324/RSUP.pdf

UNESCAP (United Nations Economic and Social Commission for Asia and the Pacific). n.d. "Closing the Loop." Bangkok: UNESCAP. https://www.unescap.org/projects/ctl

Unilever. n.d. "Rethinking plastic packaging." https://www.unilever.com/planet-and-society/waste-free-world/rethinking-plastic-packaging/

Valinsky, Jordan. 2019. "New York will Start Enforcing Its Styrofoam Ban Today. Here's Where Else It's Banned." *CNN*. July 1, 2019. https://edition.cnn.com/2019/07/01/business/new-york-styrofoam-ban-trnd/index.html.

Watkins, Emma, Susanna Gionfra, Jean-Pierre Schweitzer, Mia Pantzar, Charlotte Janssens, and Patrick ten Brink. 2017. *EPR in the EU Plastics Strategy and the Circular Economy: A Focus on Plastic Packaging.* Brussels: Institute for European Environmental Policy. https://zerowasteeurope.eu/wp-content/uploads/2019/11/zero_waste_europe_IEEP_EEB_report_epr_and_plastics.pdf

World Bank. n.d. "How is the international poverty line derived? How is it different from national poverty lines?" Washington, DC: World Bank. https://datahelpdesk.worldbank.org/knowledgebase/articles/193310-how-is-the-global-poverty-line-derived-how-is-it

_____. 2017. *Public-Private Partnerships: Reference Guide, Version* 3. Washington, DC: World Bank. https://openknowledge.worldbank.org/handle/10986/29052

_____. "Project Appraisal Document. P153814. Metro Manila Flood Management Project." Washington DC: World Bank

_____. 2018b. "World Bank Announces New Global Fund for Healthy Oceans." *Press Release.* World Bank. NO: 2018/036/ENR. September 26, 2018. https://www.worldbank.org/en/news/press-release/2018/09/26/world-bank-announces-new-global-fund-for-healthy-oceans

_____. 2021a. *An Assessment of Municipal Solid Waste Plans, Collection, Recycling and Disposal of Metro Manila.* Washington DC: World Bank.

_____. 2021b. *Market Study for the Philippines: Plastics Circularity Opportunities and Barriers*. Washington, DC: World Bank. http://hdl.handle.net/10986/35295

_____. 2021c. *Plastic Survey and Product Alternatives Analysis in the Philippines Islands of Bohol, Siargao, and Siquijor.* Washington, DC: World Bank.

_____. 2021d. „PHILIPPINES: Mandanas Ruling Provides Opportunities for Improving Service Delivery Through Enhanced Decentralization." *Press Release*. World Bank. June 10, 2021. https://www.worldbank.org/en/news/press-release/2021/06/10/philippines-mandanas-ruling-provides-opportunities-for-improving-service-delivery-through-enhanced-decentralization#:~:text=As%20a%

_____. 2022a. T*owards a National Single-use Plastics Roadmap in Vietnam: Strategic Options for Reducing Priority Single-use Plastics*. Washington, DC: World Bank. https://documents1.worldbank.org/curated/en/099735106282212157/pdf/P1673070495c5c0870b80f063b827028ce2.pdf

_____. 2022b. *Behavior Change Strategy and Playbook*. Washington, DC: World Bank. https://documents1.worldbank.org/curated/en/099010006282210509/pdf/P1691320b0c-8370b008a9a038d558ee83d8.pdf

_____. 2022c. *Reducing Plastic Waste in the Philippines: An Assessment of Policies and Regulations to Guide Country Dialogue and Facilitate Action*. Washington, DC: World Bank. https://documents1.worldbank.org/curated/en/099125107222237489/pdf/P17099403d3da6044094b10b703a895c34d.pdf

_____. 2023a. *Combating the Plastic Waste Crisis in the Philippines: Implementing Extended Producer Responsibility with Lessons Learned from Korea*. Washington, DC: World Bank. https://documents1.worldbank.org/curated/en/099201003082324515/pdf/P177183036b0c904c08b1a0526fcb062538.pdf

_____. 2023b. "External Costs of Common Plastics and Alternatives." Washington, DC: World Bank. *Forthcoming*

_____. 2023c. *Philippines: Plastic Diagnostics, Field and Remote Sensing, River Monitoring, and Microplastics Assessments.* Washington, DC: World Bank. *Forthcoming*

World Economic Forum, Ellen MacArthur Foundation, and McKinsey & Company. 2016. *The New Plastics Economy: Rethinking the Future of Plastics.* January 2016. Cowes: Ellen MacArthur Foundation. https://ellenmacarthurfoundation.org/the-new-plastics-economy-rethinking-the-future-of-plastics.

WRI (World Resources Institute) Indonesia. n.d. "Indonesia National Plastic Action Partnership (NPAP)." https://wri-indonesia.org/en/our-work/project/indonesia-national-plastic-action-partnership-npap

WWF Philippines (World Wildlife Fund, Philippines), cyclos GmbH, and AMH Philippines. 2020. *EPR Scheme Assessment for Plastic Packaging Waste in the Philippines*. Quezon City: WWF Philippines. https://wwf.org.ph/wp-content/uploads/2020/12/WWF_REPORT_EPR_Philippines_2020.pdf

Yoshioka, Nagisa, Marlon Era, and Daisuke Sasaki. 2021. "Towards Integration of Climate Disaster Risk and Waste Management: A Case Study of Urban and Rural Coastal Communities in the Philippines." *Sustainability* Volume 13, Issue: 4. https://www.mdpi.com/2071-1050/13/4/1624#

ANNEXES

Annex A: Key Plastic Resins and Single-use Plastics in the Philippines

Information on the use of various plastic resins, and their recyclability is described in this annex and summarized in Table A.1.

Low-density polyethylene (LDPE) is primarily used as a film for packaging products, which includes food. LDPE is also used in bags and sando bags.[37] As the latter are challenging to collect, and have no street value, they are not recycled. Thus, LDPE has a collection ratio for recycling of only 5 to 15 percent. Recycled LDPE is made into plastic lumber, furniture, trash bags, sheeting, films (used for agricultural products), and flooring. LDPE's non-recyclable components are used in manufacturing composite products (for example, electronic and automotive parts).

High-density polyethylene (HDPE) comprises about 17 percent of all of the plastic resins consumed in the Philippines, and a large proportion of HDPE is made into film for packaging food products, and into garbage bags. Other packaging applications include shampoo bottles, milk jugs, and plastic shopping bags, such as *labo* bags.[38] The collection rate for recycling HDPE is about 25 to 35 percent. In general, HDPE can be recycled for packaging and industrial applications; however, HDPE products used for packaging food are often contaminated, so they have a low value, and little is collected. Rigid HDPE is often recycled into plastic shopping bags (*labo* bags), of which approximately 75 percent is recycled high-density polyethylene (rHDPE), and 25 percent is low-density polyethylene (rLDPE). As is the case with *sando* bags, *labo* bags are not collected by the informal sector because recyclers do not want these bags, and they will not pay for them. However, recyclers will pay for rigid HDPE, rigid LDPE, and rigid polypropylene (PP) so informal waste collectors and junk shops in Metro Manila can earn about ₱15 per kilo for these (the price in 2019).

Polypropylene accounts for about 39 percent of the domestic production of plastics in the Philippines. Because of its low cost, PP is the cheapest plastic available, and suitable for both rigid and flexible packaging such as that used in the automotive industry, and as fiber in fabrics. PP is also used in making SUPs such as plastic straws, food containers, and sando bags. PP's collection ratio for recycling is about 25 to 35 percent, and recycled PP is used for packaging and applications in the automotive, electronics, and furniture industries.[39] A high percentage of PP is used as a film for food packaging, which means that these PP products are usually contaminated, and informal collectors do not want them because they have a low value.

As polyethylene terephthalate (PET) is not produced in the Philippines, all PET resins are imported, with most coming from Asian countries. PET is primarily used in manufacturing plastic bottles for beverages and in food packaging (jars, ovenable film,[40] and microwavable food trays). Cleaned and recycled PET flakes and pellets are in high demand, globally,

37 *Sando* bags are ones with handles that are used for carrying goods.

38 *Labo* bags are multi-purpose plain plastic bags.

39 Based on interviews with key local stakeholders.

40 Suitable for cooking in an oven.

and can be used as: (i) recycled polyester staple fiber (rPSF) and recycled partially oriented yarn (rPOY) for making carpets, fleece jackets, and fill for comforters and sleeping bags; (ii) food-grade containers for food and beverages; and (iii) non-food-grade items (films, sheets, and strapping).

Collection for recycling varies, dramatically, depending on the packaging type. Due to their high value, the recycling rate for PET beverage bottles in the Philippines is about 35 to 65 percent. The estimated recycling rate for other PET packaging applications (such as sheets, films, oil bottles, and cosmetics) is 20 to 30 percent. The price of rPET fluctuates due to the varying price of virgin material. When PET prices drop, aggregators and recyclers reduce their collection of PET products because recycling these is less profitable. There is little PET recycling capacity in the Philippines. The current formal recycling capacity for PET is about 66,900 metric tons per year (MT/Y), and the informal recycling/processing capacity is about half of that.[41] The collected PET is turned into PET flakes, which is technically considered to be pre-processing, not recycling.[42] Furthermore, none of the PET bottles collected for recycling are recycled into food-grade materials. The latter is a crucial issue because as PET has a higher market value, it has potential for circularity (such as bottle-to-bottle recycling).

The domestic production of polyvinyl chloride (PVC) in the Philippines accounts for 22 percent of the country's total production of plastic resins. PVC is used in the building and construction industry, and usually ends up in construction and demolition waste. PVC has limited application in the packaging industry, other than as labels. Because of its long use-life, PVC is less likely to end up as marine debris than is the case with most other plastic products, and it does not get collected for recycling.

Domestic polystyrene (PS) production is only about 3 percent of the total resin production in the Philippines. PS and expanded polystyrene (EPS), which are not widely used in the country, comprised only 5 percent and 6 percent of total plastic consumption in 2015 and 2019, respectively (World Bank 2021b). EPS is a thermal insulator, which is used both for preserving and transporting animal protein such as meat and fish. EPS SUPs include food boxes and plastic cups, and especially cups for hot beverages. Due to improper disposal, EPS tends to break down into smaller, light-weight pieces that float in water. The collection rate of PS for recycling is less than 10 percent. The need to phase out PS production is recognized, worldwide, due to its poor recycling rate. Because the conventional floatation process in recycling cannot remove PS, it contaminates polyolefin recycling.

41 Formal PET recycling absorbed 39 percent of the consumed PET packaging, and recycling capacity was expected to grow by 65,000 MT/Y by 2022, which would enable 76 percent of the PET consumed in the Philippines to be recycled, locally.

42 Stakeholders interviewed in the Philippines widely reported that a number of informal PET processors create PET flakes and export them—primarily to China.

TABLE A.1. USES FOR VARIOUS PLASTIC RESINS, AND THEIR RECYCLABILITY IN THE PHILIPPINES

Domestic Production	Use	Collection for Recycling	Recycling
PET (Society of the Plastics Industry [SPI] Resin ID code 1)			
PET resins are imported—mainly from other Asian countries	Used for plastic beverage bottle manufacturing and food packaging (food jars, ovenable film, and microwavable food trays)	For beverage bottles: 35 to 65 percent; for sheets, films, and cosmetic bottles: 20 to 30 percent	Insufficient recycling capacity (about 66,900 MT/Y, or 39 percent of the PET placed on the market), and no capacity for recycling food-grade materials. PET is mainly exported to China
HDPE (SPI Resin ID code 2)			
320,000 MT/Y of HDPE/LDPE (36 percent of the Philippines' total production of resins	Used for food packaging, shampoo bottles, milk jugs, and plastic shopping bags such as *labo* bags	About 25 to 35 percent	As food packaging is often contaminated, it has low value so not much is collected. Rigid HDPE is often recycled into plastic shopping bags. The informal sector does not collect *labo* bags for recycling as recyclers will not pay much for them
PVC (SPI Resin ID code 3)			
200,000 MT/Y (22 percent of the Philippines' total production of resins)	Used in the building and construction industry, with limited application in packaging (only as labels)	Little information is available on the collection of PVC that is used in packaging	If not properly removed from packaging, PVC labels can enter the recycling process and hamper it
LDPE (SPI Resin ID code 4)			
320,000 MT/Y of HDPE/LDPE (36 percent of the Philippines' total production of resins)	Used as packaging film for food and for *sando* bags	About 5 to 15 percent	As LDPE food packaging is usually contaminated, it has low value, so it is not collected for recycling. Rigid LDPE has higher value if it can be recycled (such as in Metro Manila)
PP (SPI Resin ID code 5)			
350,000 MT/Y (39 percent of the resins produced in the Philippines)	Ideal for both rigid and flexible uses such packaging, straws, and food containers	About 25 to 35 percent[43]	As PP film products for food packaging are usually contaminated, collectors and recyclers do not want them
PS (SPI Resin ID code 6)			
30,000 MT/Y (3 percent of the Philippines' total production of resins)	Food packaging, including Styrofoam (EPS) for food, and single-use cups	Less than 10 percent	Poor recycling outcomes as it contaminates the polyolefin recycling system
Mix of Plastic Resins (SPI Resin ID code 7)			
Multilayer, multi-material flexibles form an important percentage of packaging for consumer goods in the Philippines	Film for packaging, which includes food packaging and sachets	Low collection rates, due to their low value in the recycling market, which means that much of the waste ends up in landfills, dumpsites, or is burned (more than 90 percent)	Recycling is generally low, as recyclers cannot get the financing they need to scale up as they do not earn enough to reliably repay a loan. Between 3 to 7 percent of the waste becomes refuse-derived fuel (RDF) for use in factories such as cement plants, and less than 2 percent is recycled into products such as eco-bricks, lumber, and furniture

43 Based on interviews with key local stakeholders.

Annex B: Actions and Timelines for the Plastic Waste Management Roadmap

Outcome 1: Plastic Leakage Pathways Closed				
Actions	**Lead Stakeholder/s**	**Support**	**Funding Source**	**Timeline**
Preparations to Reduction of Non-Recyclable SUPs				
Define standards and guidelines to implement the EPR Law	DENR, DTI, NEC	NSWMC	GAA	2023–2040
Conduct a study to identify the SUPs that could be easily phased-out	NSWMC	DTI, DENR, DOST	GAA, NSWMF	2023–2025
Conduct LCAs to identify options for eco-designs, eco-labeling, and alternatives to SUPs	DOST, DTI	NSWMC, DENR	GAA	2023–2040
Enact the laws that support the reduction of non-recyclable SUPs	Congress, LGUs	DILG, NSWMC	GAA	2023–2040
Formulate IRR on reduction of non-recyclable SUPs and prepare related guidelines	DENR, DILG, DOF	NSWMC	GAA	2028
Improve LGUs' Waste Collection Systems				
Audit the LGUs' waste collection systems to identify facilities that could be the focus for short- and medium-term actions for increasing recovery	DENR-EMB, LGU	NSWMC, DILG	GAA	2023–2025
Improve plastic and solid waste collection, including procuring waste collection vehicles	LGU	DILG	LGU IRA, Loan/ Grant	2024 onward
Improve the Recovery of Recyclables, Recycling, and Waste Disposal				
Conduct an audit to develop an inventory of existing MRFs, recycling facilities, and sanitary landfill sites	DENR-EMB, LGU	NSWMC, DILG	GAA	2023–2024
Conduct feasibility studies to plan investments for designing and constructing additional MRFs, recycling facilities, and SLFs	LGU, Private Sector	NSWMC, DENR	GAA, Loan, Grant	2023 onward
Expand plastic waste recovery from PET and HDPE to include PP and LLDPE with focus on flexibles	LGU, NSWMC	Private Recyclers	Funds from private companies	2023 onward
Increase the capacity of recycling facilities	Recycling companies	DTI, NSWMC	Funds from private companies	2023 onward
Improve the Sourcing of Funds and Financial Management				
Survey the LGUs and private sector regarding the waste collection fees they charge businesses	DENR	NSWMC, LGUs	GAA	2023
Prepare technical guidelines on cost-recovery mechanisms for plastic waste management	DILG, DENR	LGUs	GAA	2024
Simplify the guidelines and requirements for loan and grant applications for plastic waste and SWM projects	Development Banks	DOF, NSWMC	Multilateral and bilateral funding agencies	2023–2024
Build the capacity of the LGUs with staff training on how to prepare feasibility studies	NSWMC	DILG, LGU	GAA, NSWMF	2024–2025
Prepare technical guidelines on the establishment and operationalization of local Solid Waste Management Funds	DILG	LGUs	GAA	2025

Outcome 2: Plastic Recycling Enabled				
Actions	**Lead Stakeholder/s**	**Support**	**Fund Source**	**Timeline**
Develop the LGUs' Capacity to Carry Out Plastic and Solid Waste Management				
Amend Section VIII of RA 9003's IRR in the NSWM Framework to raise awareness about plastic waste, its impacts, and sustainable alternatives	DENR	NSWMC	GAA	2024
Develop and implement a communication strategy on plastic waste management	Barangays, LGUs, DILG	DepEd, TESDA, CHED, DILG and PIA	GAA	2024 onward
Develop guidelines and procedures for reporting waste-related data	NSWMC	DENR	GAA	2023
Develop standards and guidelines to implement the EPR Law	DENR	NSWMC, Private sector	GAA	2023–2024
Develop guidelines and training for hotels on SUPs	DOT	LGUs, Private sector	GAA	2023
Develop and issue guidelines for compliance on eco-design and Green Public Procurement	DTI	All government offices	GAA	2023
Develop national standards for the quality of plastic recyclates	DTI-BPS	DENR, DILG, LGUs	GAA	2024
Issue minimum technical operating standards for junk shops	NSWMC	DENR	GAA	2025
Integrate the Informal Sector into the LGUs' SWM Systems				
Prepare guidelines for the registration and accreditation of informal workers in the LGUs' SWM system	DILG	NSWMC, LGUs	GAA	2025–2028
Prepare guidelines on the minimum health and safety requirements for waste pickers working in the MRFs	DOLE, DILG	DOH LGUs Local NGOs	GAA	2023
Pilot SWM projects that promote the integration of informal workers	DOLE, DILG	DOH LGUs Local NGOs	GAA	2023
Increase the Production of Good Quality Plastic Recyclates				
Develop O&M standards for MRFs, and an operations manual for barangays' SWM Committees	NSWMC	DENR, DILG, LGUs	GAA	2023
Develop national standards for the quality of plastic recyclates	DTI-BPS	NSWMC	GAA	2025
Establish a plastic certification scheme for plastic recyclers	DTI-Philippine Accreditation Bureau (PAB), DENR	NSWMC, Plastic recyclers	GAA	2027 onward
Increase Know-how, Technology Development, and Information Exchanges on Recycling and Waste Management				
Issue a resolution requiring obligatory reporting by all waste management operators	DENR	NSWMC	DENR-EMB funding allocation in the GAA	2023
Prepare a standardized methodology and forms for reporting waste-related data	DENR	DOST, NSWMC	GAA	2023
Prepare information, education, and communication campaigns on data collection, recording, reporting, and database access	DENR, LGUs	DILG, NSWMC, Waste recyclers	GAA	2024
Design a database on plastic recovery and recycling	DENR	DILG, NSWMC, Waste recyclers, LGUs	GAA	2024

Outcome 3: Demand for Plastics Managed and Products Designed for Circularity				
Actions	**Lead Stakeholder/s**	**Support**	**Fund Source**	**Timeline**
Progressively Reduce Non-Recyclable SUPs				
Adopt eco-design, eco-labeling, SUP alternatives, and Green Public Procurement	DOST, DTI, PECEPSDI	DENR	GAA	2026–2040
Enforce the provisions of the EPR Law	NEC	DENR, NSWMC	GAA	2023–2040
Enforce new laws concerning SUPs	DENR, LGUs	NSWMC	GAA	2027–2043
Reduce non-recyclable SUPs in tourism areas				2027–2043
Reduce non-recyclable SUPs nationwide	DENR, LGUs	NSWMC	GAA	2029 onward
Engage the Private Sector in Plastic Reduction and Waste Management				
Encourage the HORECA sector and other tourist enterprises to make voluntary pledges to reduce SUPs	Private sector	DTI, DOT, DENR, NSWMC	Private sector	2025 onward
Establish working groups on EPR implementation that include government, plastic producers, and other relevant stakeholders	NSWMC	Concerned govt. agencies, Private sector	GAA	2024 onward
Conduct Information, Education, and Communication Campaigns				
Conduct information, education, and communication campaigns on alternatives to SUPs and the harmful impacts of mismanaged plastic waste	LGU, DENR	Plastic producers/ manufacturers,EMB	GAA	2023 onward

Annex C: Proposed Institutional Set-up: Philippine Plastic Waste Management Roadmap

National Solid Waste Management Commission (NSWMC)

The National Solid Waste Management Commission's role is crucial in the Roadmap's implementation as it is the coordinating body for policymaking, planning, and the regulation of plastic waste under RA 9003 (2000), and its amendments. As such, the NSWMC would coordinate the Roadmap-related efforts of the Department of Trade and Industry (DTI), Department of Science and Technology (DOST), Department of Health (DOH), Department of Agriculture (DA), Department of Environment and Natural Resources (DENR), Department of the Interior and Local Government (DILG), Metro Manila Development Authority (MMDA), League of Provinces of the Philippines (LPP), League of Cities of the Philippines (LCP), League of Municipalities of the Philippines (LMP) and the Philippine Plastics Industry Association (PPIA). The NSWMC also cooperates on common concerns with the Department of Tourism (DOT), Department of Finance (DOF), National Economic and Development Authority (NEDA), Bureau of Customs (BOC), Intellectual Property Office (IPO), Department of Education (DepEd), and Commission on Higher Education (CHED). In addition, the NSWMC is responsible for issuing the list of non-environmentally acceptable products (NEAPs) that will be prohibited under RA 9003. In accord with the LGUs' SWM Plans, which they submit to the NSWMC for evaluation and approval, the NSWMC guides the LGUs in strengthening their institutional set-up, improving their waste collection and treatment, and integrating informal workers into their SWM system. The NSWMC is the primary body, too, in implementing the EPR Law.

National Ecology Center (NEC)

Under the NSWMC, the National Ecology Center (NEC) is responsible for identifying, reviewing, and updating the list of NEAPs and plastic packaging materials to recommend to the NSWMC for phasing out. In coordination with academic and training institutions such as the DepEd, CHED, and Technical Education and Skills Development Authority (TESDA), the NEC also facilitates training and education for the LGUs and private businesses on proper SWM, SWM facility technical operations and maintenance (O&M), and enforcement of the SWM regulations.

In coordination with the DTI, DENR, DILG, and other concerned agencies, the NEC is responsible for establishing and managing a comprehensive solid waste management information database and dissemination system on: solid waste generation and management techniques; management, technical, and operational approaches to resource recovery; processors/recyclers; the materials being collected and recycled, and their respective prices; the rate of recovery and diversion for each type of plastic waste; the cost of recovery and diversion for each type of plastic waste; and SWM and recycling technologies. Under RA 9003, the NEC is also responsible for promoting the development of the recycling market through establishing a national network that will enhance the opportunities to recycle, and provide the LGUs, NGOs, and industry with information on cleaner production and technologies for SWM.

Department of Environment and Natural Resources (DENR)

RA 9003 has designated the Secretary of the Department of Environment and Natural Resources (DENR) as the chair of the NSWMC, the DENR Environmental Management Bureau (DENR-EMB) as the host for the NSWMC Secretariat, and the Assistant Director of the DENR as the head of the NEC. (as amended under RA 9003) also authorizes the DENR to establish the methods and parameters for measuring waste reduction, collection, and disposal, and providing technical and other capacity building assistance on SWM to the LGUs.

The DENR, and particularly the EMB, plays a key role in the preparation of the IRR for RA 9003, and the National Framework for All Types of Product Wastes, as well as the implementation of the EPR Law. In particular, the EMB, together with the Department of Trade and Industry's Bureau of Philippine Standards (DTI-BPS), and relevant industry associations, determines the targets for recycled content in packaging materials; provides guidelines on the diversion of packaging materials; formulates and adopts the system for crediting Plastic Footprint Reduction Accomplishments; and monitors and evaluates the Obligated Enterprises/ Producer Responsibility Organizations' compliance with the EPR Law. The EMB could also assist in securing SWM data from the LGUs for inclusion in the NEC's database, and the environmental impact assessment (EIA) system could generate SWM and plastic waste-related data/information from the regulated companies.

Department of Trade and Industry (DTI)

The Department of Trade and Industry (DTI) is a key agency for improving recycling in the Philippines, and the DTI Bureau of Philippine Standards (DTI-BPS) and the NSWMC, in collaboration with other government agencies, are responsible for formulating standards for the appropriate environmental labeling of products and packaging by enterprises and manufacturers, whether they are covered by the EPR Law, or not. The DTI-BPS, as an initiative of the NSWMC, DENR-EMB, and DTI, is also mandated to develop and promote the adoption of Plastic Product Footprint generation and recovery standards. In addition, the DTI is expected to collaborate with the Auditing and Assurance Council (AASC) in developing and promulgating a standardized compliance auditing

manual on the EPR Law, and with the NEC in establishing and managing the SWM information database.

Under RA 9003, and its amendments, the DTI, in cooperation with other agencies, is responsible for conducting and publishing studies on the markets for processing and purchasing recyclable materials, as well as making recommendations for improving these markets. The DTI could also provide support to improve the collection and processing of post-consumer materials. In addition, based on the IRR of the EPR Law, the DTI could encourage MSMEs to implement extended producer responsibility (EPR), and then through the Bureau of Small and Medium Enterprise Development (BSMED), assist MSMEs in adopting EPR Programs.

Department of Science and Technology (DOST)

The Department of Science and Technology (DOST) and its offices—the Industrial Technology Development Institute (ITDI), Environmental and Biotechnology Division (EBD), Materials Science Division (MSD), and Packaging Technology Division (PTD)—are responsible for supporting actions that will lead to increasing the capacity of the LGUs for recycling, reducing the demand for plastics, and promoting the Circular Economy. The DOST is also tasked with initiating a study on alternatives to non-recyclable and non-reusable materials; developing an environmental technology verification (ETV) program for evaluating technologies prior to their local introduction; promoting the development of a clean technology (CT)/clean production (CP) program in industry; developing and applying new and improved methods for collecting and disposing of solid waste, and processing and recovering materials and energy from solid waste; improving the utilization of various types of organic materials as a source of fertilizer and biofuels; and conducting a study on developing new uses for recovered resources.[44]

Department of Health (DOH)

The Department of Health (DOH) is responsible for increasing informal sector workers' awareness about health and safety when they are collecting and processing plastic recyclables. Under RA 9003, the DOH spearheads studies on the negative impacts of solid waste on the health of scavengers, garbage collectors, and other personnel involved in SWM programs; and develops training guidelines for collectors and other personnel involved in handling solid waste.[45] In addition, the DOH is responsible for preparing the Health Care Waste Management Manual that explains the effective and proper handling, collection, transport, treatment, storage, and disposal of health care wastes.[46]

Department of Labor and Employment (DOLE)

The Department of Labor and Employment (DOLE) is responsible for providing support to ensure the safety of informal workers. Under the Labor Code and its IRR, occupational health and safety standards must be set up and enforced in all workplaces, including SWM facilities. Under RA 11058,[47] the government guarantees a safe and healthy working environment for employees by providing protection from all possible dangers in any place where work is being done.

Department of Tourism (DOT)

Regarding the reduction of non-recyclable SUPs in tourist facilities, the Department of Tourism (DOT), which issues the National Accommodation Standards, could revise these to include additional indicators on SUP consumption in hotels and other accommodation, and collaborate with the private sector, the LGUs, and other stakeholders to produce guidelines on reduction of non-recyclable SUPs in tourist areas. The DOT could raise awareness, too, about SUPs and their alternatives by providing education and training for hotel operators and other establishments that cater to tourists, and also encourage tourism businesses to make a public pledge to reduce SUPs.

Department of the Interior and Local Government (DILG)

For actions that are LGU-led, the Department of the Interior and Local Government (DILG) plays an important role. Under Executive Order No. 262 (1987),[48] the DILG is responsible for: assisting the Philippines' President in supervising local government; facilitating the setting up of SWM Boards; collaborating with the DENR, NEDA, and the various LGU Leagues in developing a coordinating mechanism to guide the LGUs in preparing their SWM plans; conducting and publishing a study on the markets for processing and purchasing recyclable materials, and potential steps for expanding these markets; publishing an inventory of all the solid waste disposal facilities and sites in the country; conducting an information, education, and communication campaign on SWM; ensuring the ongoing provision of information and training on waste management for every level of LGU, down to the barangays; and enforcing compliance with SUP prohibitions, and charging penalties for violations.[49]

Local government units (LGUs)

Consistent with RA 7160 (1991), within their respective jurisdictions, the LGUs are principally responsible for the implementation and enforcement of RA 9003, and its amendments. RA 9003 (2000), its amendments, and its

44 DENR AO 2001-34.

45 DENR AO 2001-34.

46 Sec. 3 (e), OP AO 16, s. 2019.

47 An act that strengthens compliance with occupational safety and health standards and provides penalties for violations.

48 Reorganizing the Department of Local Government, and for other purposes.

49 DENR AO 2001-34.

IRR require the LGUs to establish Solid Waste Management (SWM) Boards at the provincial and city/municipal levels, and SWM Committees at the barangay level; prepare and submit a 10-year Solid Waste Management Plan (SWMP); establish mandatory solid waste diversion; implement the mandatory segregation of solid waste; establish a MRF in each barangay or cluster of barangays; close all open dumpsites and establish sanitary landfill facilities by 2006; and establish reclamation programs and buy-back centers for recyclables and toxic products.

The SWM Board is the policy-making body at the local level that formulates an LGU's SWMP. Execution of the SWMP is carried out by the local chief executive through the LGU's Environment and Natural Resources Office (ENRO) or its Solid Waste Management Office (SWMO). The status and composition of an ENRO or SWMO varies from one LGU to another because the creation of such an office is not mandatory under RA 7160. The LGUs could strengthen their institutional mechanism by creating an ENRO, and through a local ordinance, develop the capacity of its personnel.

In consultation with the DENR, DTI, DOST, the private sector, and other entities, the LGUs could enact ordinances that prohibit the use of non-recyclable SUPs that can be easily phased out. Similarly, through local ordinances, the LGUs can require the registration of junk shops and their adoption of SWM standards; impose SWM fees to enhance cost-recovery mechanisms; employ informal workers in the operation of MRFs; support the tourism sector in reducing non-recyclable SUPs; allocate a budget for training the LGU personnel who are involved in SWM; and support the implementation of the EPR Law, and particularly through setting up partnerships with the Obliged Enterprises, PROs, and MSMEs.

Annex D: Stakeholder Consultations Conducted in Preparing the SUP Roadmap

In preparing this publication, *Guidance on the Development of a Roadmap for Managing Plastic Waste and Reduction of Non-Recyclable Single-use Plastics in the Philippines*, the Cabinet Cluster on Climate Change Adaptation and Disaster Risk Reduction's Technical Working Group on the Circular Economy, Sustainable Consumption and Production, and Single-use Plastics (TWG on CE, SCP, and SUPs), which is led by the Department of Environment and Natural Resources (DENR), in collaboration with the Department of Finance (DOF), and the Climate Change Commission (CCC) Secretariat, served as the platform for knowledge exchange, government agencies' review, and technical deliberations.

The DOF introduced the concept of developing the Roadmap in the first TWG meeting on March 11, 2021, after which the World Bank's Task Team, which would coordinate the Roadmap's development, made a presentation on other Asia Pacific countries' experiences in developing plastic waste management roadmaps. As a crucial component of effective solid waste management (SWM), it was agreed in the meeting that the Philippines' Roadmap would serve as a guide in pursuing actions that build on existing and future policies, legislation, and regulations, and which could be readily implemented with a step-by-step approach.

In the second TWG meeting on May 14, 2021, it was agreed that the Roadmap would comprise the major Milestones, and Actions that are needed to: (i) achieve significant reduction in SUPs' consumption, and increase the recovery of SUPs for recycling and treatment, or their proper disposal; (ii) ensure a just transition, and provide social safety nets for affected workers and businesses, and especially for MSMEs; (iii) formulate producer responsibility schemes that make producers financially responsible for the management of their products' waste from production to disposal; (iv) develop strategies for identifying and mainstreaming the use of reusable and compostable single-use plastic (SUP) alternatives; (v) increase awareness about the impact of SUPs' use, their improper disposal, and best practices in plastic and solid waste management; and (vi) establish mechanisms for fiscal and non-fiscal rewards and incentives. Additionally, it was agreed among the various stakeholders attending the meeting that the Roadmap would be strategically formulated to remain relevant, regardless of progress on the legislative measures to phase out single-use plastic products that were proposed in the Philippines' 18th Congress.

The third TWG meeting on December 14, 2021 was the inception meeting for the Roadmap's preparation after the consultant, Environment Agency Austria, had been hired to undertake the assignment. The meeting developed common understanding about the scope of work, tasks involved, lead agencies for the key components of the Roadmap, and specific activities required to prepare the Roadmap.

The fourth TWG meeting on March 3, 2022 discussed the Gap Analysis Report that had been prepared for the Roadmap.

In addition to the TWG meetings, consultations were held with a number of government agencies, international development partners, private sector associations, and NGOs to examine the policy and implementation gaps that impact the different sectors involved in plastic waste management. These consultations included the:

- Climate Change Commission (CCC);
- Department of Environment and Natural Resources (DENR);
- Department of Finance (DOF);
- Department of the Interior and Local Government (DILG);
- Department of National Defense (DND) – Office of Civil Defense;
- Department of Science and Technology (DOST)
- Department of Tourism (DOT);
- Department of Trade and Industry (DTI);
- Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ);
- European Union Delegation;
- House of Representatives Committee on Ecology;
- National Economic and Development Authority (NEDA);
- Philippine Alliance for Recycling and Materials Sustainability (PARMS);
- Philippine Plastics Industry Association (PPIA);
- Senate Committee on Environment, Natural Resources, and Climate Change;
- United Nations Development Programme (UNDP);
- United Nations Human Settlements Programme (UN-Habitat); and
- World Wildlife Fund – Philippines.

Annex E: External Evaluations of the Roadmap's Implementation

Three external evaluations should be conducted to assess the independence, openness, objectivity, and transparency of the internal monitoring and evaluation carried out by the Roadmap's implementing agencies. For this purpose, the external evaluator would have access to the information required to precisely assess compliance in implementing the targeted measures, and whether the financial resources have been used effectively. Thus, over the period of the Roadmap's implementation, the following three external evaluations should be carried out:

- **Foundation assessment.** Since the foundation for an effective plastic waste management system will be laid in the Roadmap's first five years, it is vital to assess the degree of success in implementing the Actions envisaged over this period (conduct in 2028, at the end of the short-term period, 2023–2028).
- **Mid-term review.** A Mid-term Review should be conducted halfway through the full implementation of the Roadmap to assess its progress, and the impacts achieved through its Actions (conduct in 2034, at the end of the medium-term period, 2028–2034).
- **Final evaluation.** A Final Evaluation should be conducted at the end of the Roadmap's implementation to evaluate progress and the impacts achieved through the Actions carried out over the Roadmap's whole implementation, and this should recommend future measures (conduct in 2040, at the end of the long-term period, and the full implementation of the Roadmap).

Evaluation of the implementation of the waste management program should be carried out by comparing the baseline data with the results achieved. In addition to objectively evaluating the technical and economic results, the external evaluations should take into account the non-quantifiable results, as well as the indirect results. As a result of the external evaluations, changes in some of the objectives and parameters of the Roadmap, as well as the tools used for its implementation, could be proposed.

The main reliable sources of information for use in the three external evaluations are:

- The annual National Solid Waste Management Status Report (Section 8, item b, of RA 9003);
- The Report to Congress (Section 63 of RA 9003);
- Annual status reports for the National Solid Waste Management Fund (Rule XV, Section 1, of the IRR for RA 9003), and status reports for the local Solid Waste Management Funds (Rule XV, Section 6, of the IRR for RA 9003);
- Reports on the implementation of the provincial, city, and municipal solid waste management plans from previous years;
- Information submitted on the implemented, terminated, and completed plastic waste-related projects;
- Information from the Solid Waste Management Information Database that will be established by the National Ecology Center (Section 7, item b, of RA 9003);
- Minutes of public discussions and workshops on themes related to the implementation of waste management programs, plans, and so on; and
- Questionnaires and/or survey cards used for gathering public opinions.

January 2024

WORLD BANK GROUP