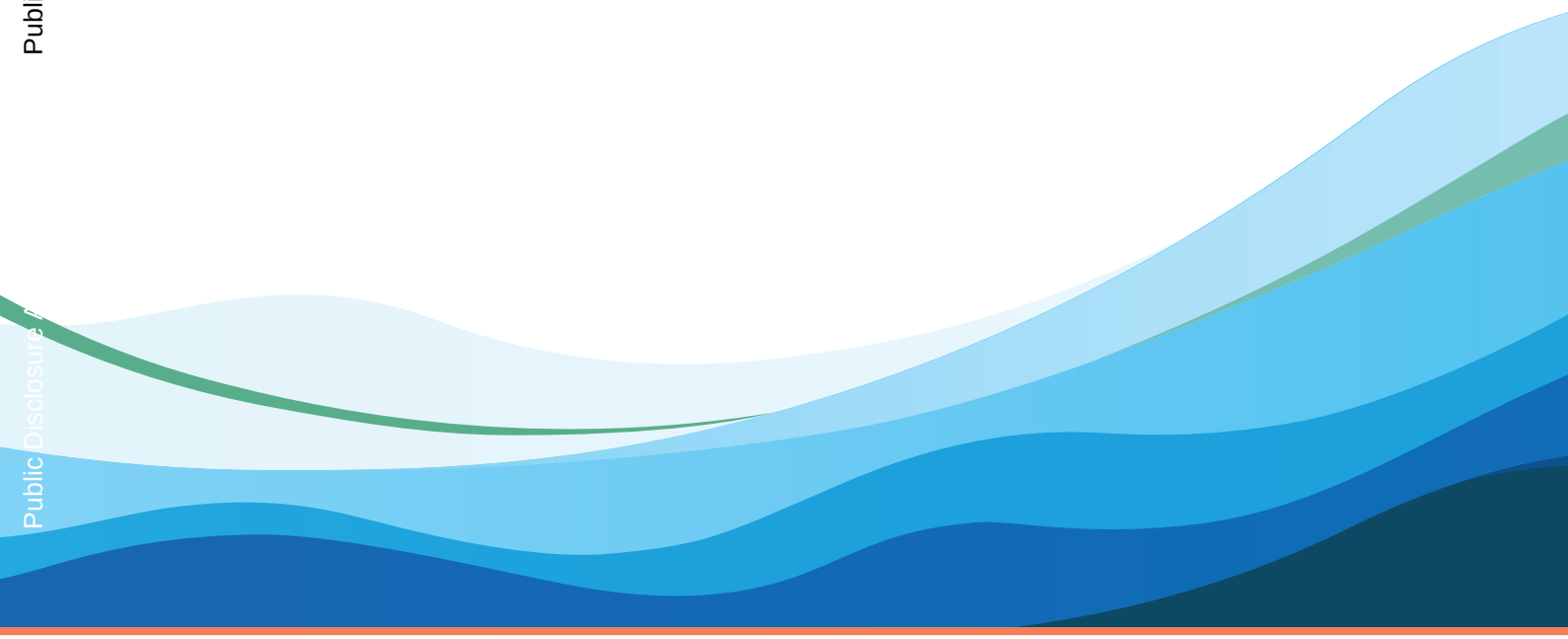
East Asia and Pacific Region: **MARINE PLASTICS SERIES**

Appendices

MARKET STUDY FOR THE PHILIPPINES:

Plastics Circularity Opportunities and Barriers



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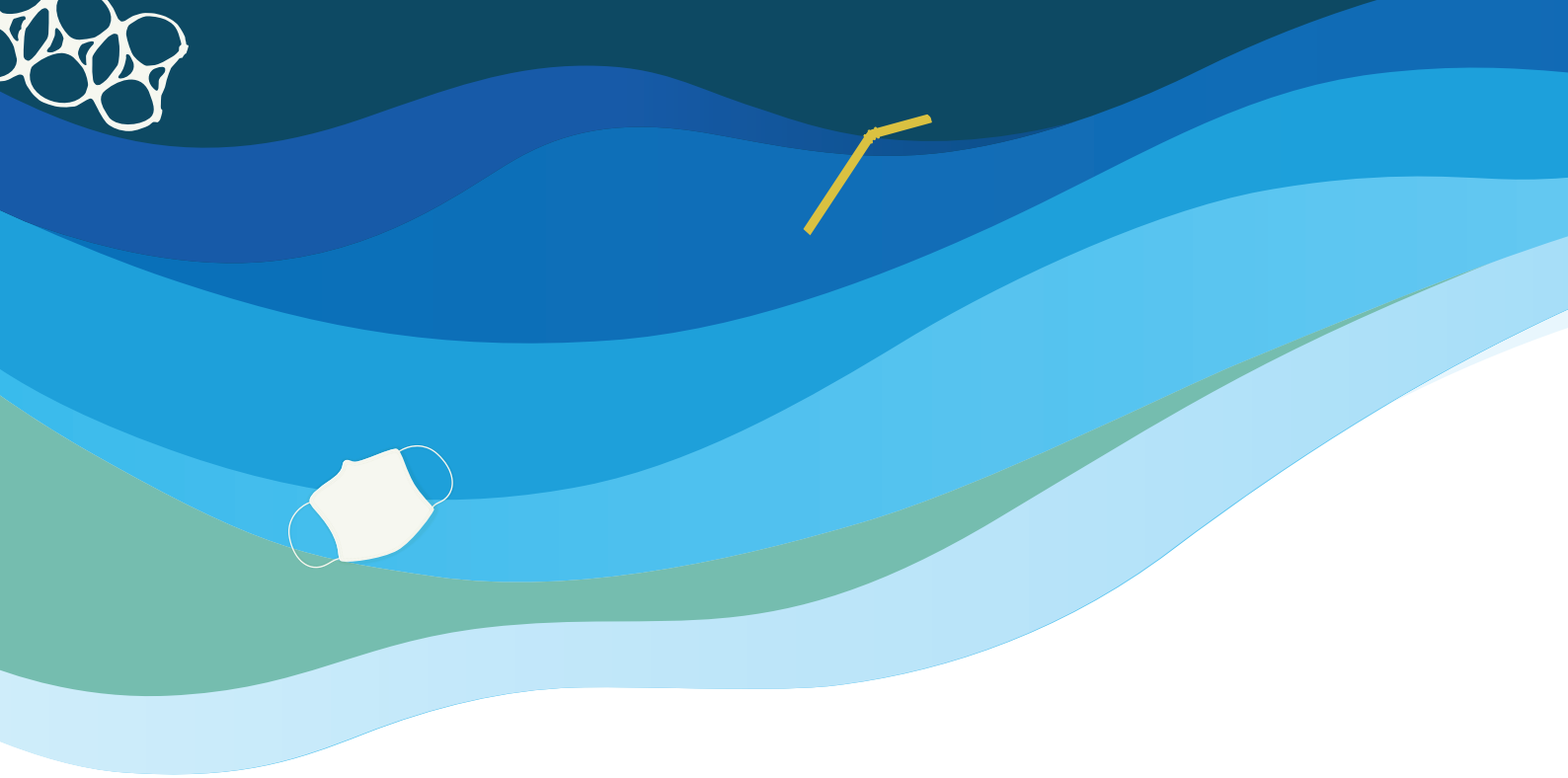

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Appendices

MARKET STUDY FOR THE PHILIPPINES:

Plastics Circularity Opportunities and Barriers

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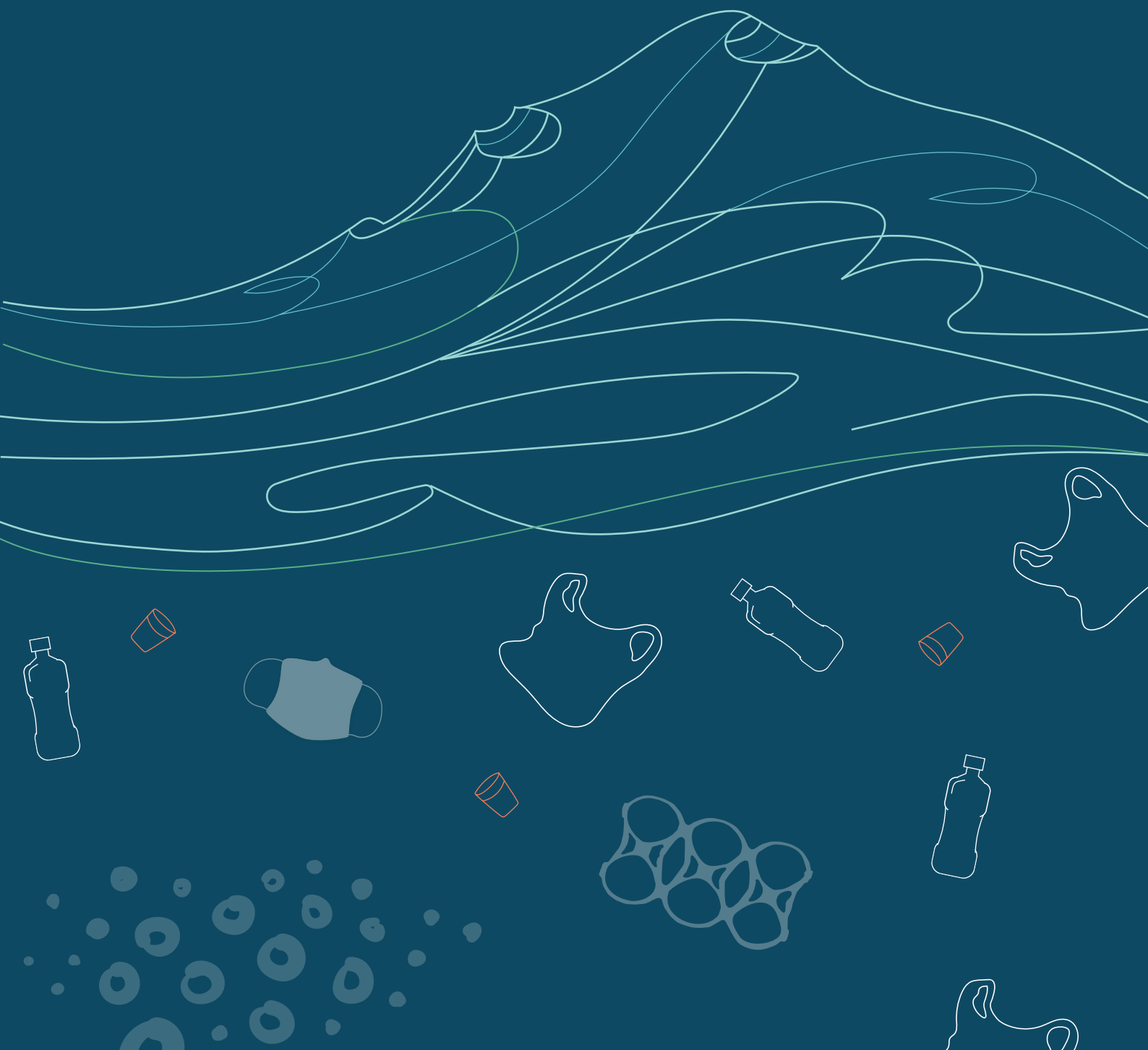
APPENDICES



APPENDIX 1:

VIRGIN RESIN PRODUCERS ACTUAL/ PLANNED CAPACITIES

Table A1.1.
VIRGIN RESIN PRODUCERS ACTUAL/PLANNED CAPACITIES

Resin Producer	Resin	Virgin Resin Production Capacity (TPY)	Planned Additional Capacity 2020 Onwards (TPY)
JG Summit	PE	320,000	250,000
	PP	190,000	110,000
Philippine Propylene Inc.	PP	160,000	-
Philippine Resins Industries	PVC	200,000	Unknown
Chemrez	PS	30,000	Unknown

Note: Data collected via interviews with Petrochemical industry stakeholders

APPENDIX 2:

FURTHER DEFINITIONS ON CIRCULARITY AND OTHER RELATED CONCEPTS

2.1 FURTHER DEFINITION OF CIRCULARITY

To better understand and utilize this definition for this study on plastics circularity, it is important to dissect the definition. This can be done through three approaches:

1. **Plastics circularity for a strong, innovative and resilient plastics industry**
   This approach to plastics circularity is the focus of this study and it builds on the foundation of the Philippines' existing plastics industry. This approach to plastics circularity includes the following activities:
   - Reduction of plastics usage/single-use plastics usage
   - Moving toward 100% reusable, recyclable, biodegradable or compostable plastics materials
   - Increasing local plastics recycling capacity
   - Increasing production and use of recycled plastics content
2. **Plastics circularity as a means to address climate change**
   The world is becoming increasingly aware of the climate crisis. However, the efforts to tackle this crisis focus mainly on a transition to renewable energy, which only addresses 55% of global greenhouse gas emissions. The remaining 45% comes from making the products we use every day sustainable, according to a 2019 report by The Ellen MacArthur Foundation[1]. If countries are serious about achieving the climate goals, they need to address and tackle this remaining 45%. While meeting climate change and other related emissions targets is becoming an important driver for circular economy efforts in the private sector, plastic circularity as a means to address climate change will be built on the foundation of the first approach outlined above.
3. **Plastics circularity as a means to address resource inefficiency**
   According to a UN Environment report in 2019, each year, 90 billion tonnes of primary materials are extracted and used globally, with only 9% recycled[2]. This is commercially and environmentally unsustainable. In the last two decades, not only have resource inefficiencies and pollution challenges become more severe, but countries around the world are also seeing the limits of a linear economy built on the model of "take-make-dispose." The current linear economy system is no longer working for businesses, people or the environment. Addressing the question of resource efficiency through plastic circularity, however, is out of scope of this study and this approach will not be covered.

2.2 OTHER DEFINITIONS USED IN THE STUDY

In addition to circularity, other terms need to be explained to understand the details and contexts of how the Circular Economy works.

Waste: The Basel Convention Waste defines waste as "substances or objects which are disposed of or intend to be disposed of by provisions of National Law."

Municipal Waste/Post-Consumer Waste: Municipal waste is waste disposed of by households or commercial entities after consumption. It is collected through the public waste collection infrastructure of the city. Therefore, post-consumer waste is typically dirty as organic waste produced by residential and commercial sources mixes into the municipal waste collection system.

1 Ellen MacArthur Foundation - Completing The Picture (2019)

2 United Nations Environment Programme - Global Resources Outlook (2019)

Industrial Waste/Post-Industrial Waste: Industrial waste is waste generated from industrial activities, such as chemical containers, pallet film wraps and factory offcuts. These wastes are typically disposed of through privately contracted waste collection services. It is usually less contaminated than post-consumer waste because it is not typically mixed with other types of waste—unless it has already been contaminated due to the industrial activity it is produced from. In fact, some factories might engage recyclable collectors to collect their recyclables, which is usually cheaper than simply disposing of the materials.

Recycling: Recycling processes may be categorized as two types—mechanical recycling and chemical recycling.

- **Mechanical Recycling:** The Basel Convention defines mechanical recycling as "the processing of plastic waste into secondary raw material or products without significantly changing the chemical structure of the material" (e.g. example, the flaking and pelletization of post-consumer PET bottles into rPET pellets).
- **Chemical Recycling:** The Basel Convention defines chemical recycling as "the depolymerization of long polymer chains into monomers through a chemical reaction by means of heat and/or chemical agents to produce monomers, chemical raw materials and/or fuels." Technologies that convert plastics back into secondary raw materials or fuels can fall under two broad categories: (a) plastic-to-plastic (via naphtha or monomer recycling) or (b) plastic-to-fuel (PTF).[3] DEMETO—a European project which uses microwave-based processes to de-polymerize PET at an industrial scale by converting it back to its composing elements (Ethylene Glycol and Terephthalic Acid)—is an example of monomer recycling. Pyrolysis of multilayer flexibles into refuse derived fuel is an example of PTF recycling. While harmonized definitions for chemical recycling are yet to be developed, in the EU—which leads in the development of these technologies— the chemical recycling industry considers plastic-to-fuel technologies to be energy recovery, not recycling (as they are linear). Only plastic-to-plastic technologies (such as those that produce naphtha or monomers directly) are considered to fall under existing EU definition of recycling in the EU Waste Framework Directive.[4]

With regard to circularity, mechanical recycling is usually preferred as it requires less energy and has a lower technological requirement. Furthermore, it is possible to obtain the original product back through mechanically recycling waste recyclables, hence achieving true circularity. On the other hand, chemical recycling is able to handle most types of materials that are not yet recyclable through mechanical recycling methods (e.g. multi-layer flexibles).

For mechanical recycling, circular recycling, where the product of the recycling process is similar to input material (e.g. bottle-to-bottle recycling), is preferred to downcycling, where the products are different than the original input (e.g. PET to rPET fiber). This is because downcycling degrades the integrity and quality of the material and hence, reduces the value. This means that the incentive to collect these materials will then be lower compared to a truly circular recycling process.

Energy Recovery: Energy recovery is defined as the generation of heat, steam or electricity through the process of utilizing waste (plastics) as substitutes of primary fossil fuel resources for the production of fuel, for energy recovery. This is the least preferred method for recycling as it is the least efficient. However, for governments it is a convenient method to tackle two issues, waste management and electricity generation, with one solution.

3 A Circular Solution to Plastic Waste by BCG

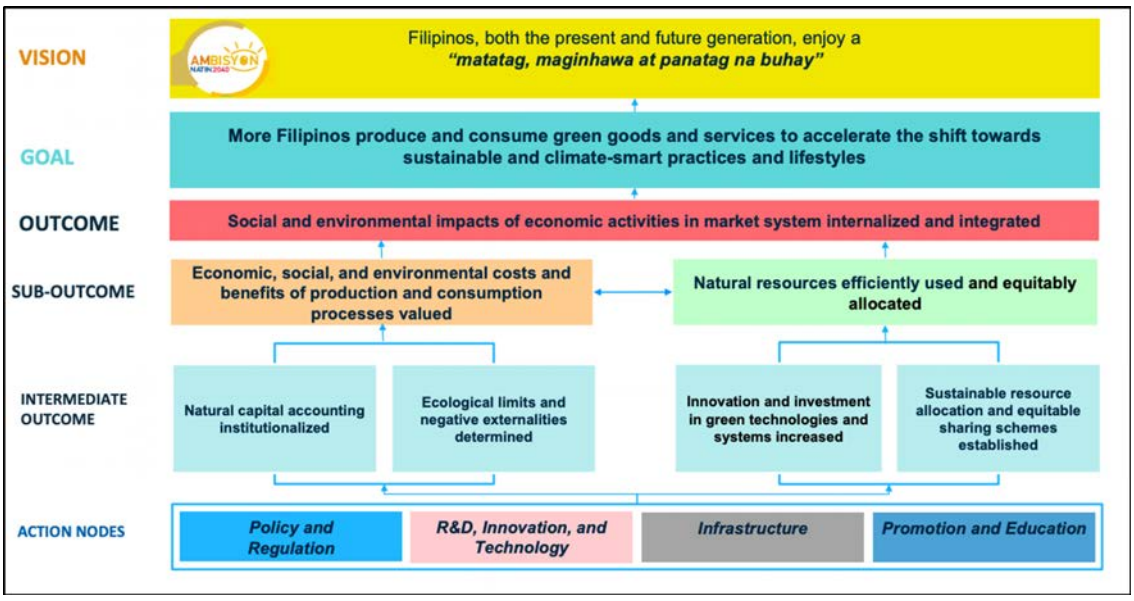
4 Chemical Recycling Europe

APPENDIX 3:

PHILIPPINES ACTION PLAN FOR SUSTAINABLE CONSUMPTION AND PRODUCTION (PAP4SCP): CIRCULAR ECONOMY AND WASTE MANAGEMENT RELATED GOALS

To contribute to the efficient use and equitable allocation of natural resources, the PAP4SCP identifies the need to increase innovation and investment in green technologies and systems. To achieve these goals, actions related to solid waste management and plastics circularity are deemed necessary particularly those related to (a) policy and regulation, (b) research and development, innovation, and technology, (c) infrastructure, and (d) promotion and education. Figure A3.1 shows the overall PAP4SCP Strategic Framework.

Figure A3.1.
PAPS4SCP STRATEGIC FRAMEWORK



The Table A3.1 presents the short-, medium- and long-term actions related to solid waste management and plastics circularity set out under PAP4SCP.

Table A3.1.

SHORT, MEDIUM, AND LONG-TERM ACTIONS RELATED TO SOLID WASTE MANAGEMENT AND PLASTICS CIRCULARITY SET OUT UNDER PAPS4SCP

Node of Action	Node of Action Short-term (2020-2022)	Medium-term (2022-2030)	Long-term (2030-2040)	Responsible Agency
Policy and Regulation	Review and amend the Ecological Solid Waste Management Act (RA 9003) to: (a) enhance financial and technical support for LGUs in setting up appropriate waste management equipment and facilities and services; (b) implement "choice editing" strategies (e.g. regulating single-use plastics and other unsustainable products/ packaging) ; and (c) streamline ecolabeling processes/systems	Continue lobbying for the enactment and amendment of priority legislation listed in the short term. Implement new and amended laws and policies towards SCP.	Review and evaluate policy implementation.	Congress, DENR, DTI, LGUs
	Institutionalize extended producer responsibility (EPR) incorporating "polluters pay" principle and linking sustainability reports of companies.	Support industries/ startups to develop alternative/substitute products (e.g. gadgets and appliances) with minimal residuals & longer utility.	Review and evaluate implementation.	DTI, LGUs, Congress, private sector
R&D, Innovation and Technology	Study and develop alternatives to single-use plastics to support phase-out	Continue research and development		DOST, academy
	Create business models for: waste minimization (e.g. refilling stations for fast moving consumer goods as alternative to buy-and dispose/ sachet approach); and use of secondary raw materials or recycled materials (e.g. paper, plastics, and glass cullets) for production.	Scale up business models for waste minimization and adoption of technology/ processes that utilize secondary raw or recycled materials (e.g. paper, plastics, and glass cullets and other construction and demolition waste).	Transform business models to internalize environmental costs of production and consumption.	DTI, DENR, academe, private sector
Infrastructure	Increase public and private investment in storage, collection, treatment, recovery and disposal facilities of solid and hazardous waste, including clinical/medical waste and e-waste.	Scale up establishment of necessary recovery/ reuse, recycling, and repair facilities to facilitate the shift to circular economy.	Evaluate the impact and effectiveness of interventions for enhancement and strengthening.	NSWMC, DENR, DOF, LGUs
Promotion and Education	Implement updated training programs on green technology, waste and chemical management for technical education and skills development of workers	Develop and promote formal and informal courses on sustainability science and engineering.	Continue promotion and education campaigns.	DENR, DOLE (Dep. Labor and Employment), TESDA (Technical Education and Skills Development Authority)

To summarize, the PAP4SCP identifies the needed strategies and actions to improve, strengthen and fast-track the implementation of existing policies on waste management (e.g. solid, hazardous and electronic wastes) and plastic circularity. In addition, it will push for the following legislative actions:

- **Amendment of the Ecological Solid Waste Management Act of 2000 (RA 9003)** to enhance financial and technical support for LGUs in setting up appropriate equipment and facilities and services.
- **Enactment of a policy on extended producer responsibility (EPR)** to facilitate internalization of producers'/manufacturers' impacts to the environment.
- **Passage of electronic waste management policy** in anticipation of the increased generation of electronic wastes (e.g. computers and laptops, cell phones, printers, fax machines and copiers) driven by the Fourth Industrial Revolution. The proposed measure aims to: (a) institutionalize mechanisms and guidelines/standards for proper collection, handling/storage and disposal of electronic wastes; and (b) incorporate principles of urban mining in the policy to recover metals from e-waste (e.g., mining gold, silver, copper, rare earth metals from gadgets and appliances).
- **Enactment of a food waste management policy,** which aims to adopt a system to promote, facilitate and ensure the reduction of food waste through redistribution and recycling as well as establish community composting.
- **Legislating green public procurement (GPP)** to: (a) enhance compliance of procuring entities in integrating green criteria in procurement guidelines, bidding documents and technical specifications, and set clear LGU involvement based on market readiness; and (b) strengthen eco-labeling programs and other green certification schemes (e.g. green jobs, green hotels/resorts, green buildings, sustainable agriculture and fisheries).

APPENDIX 4:

STAKEHOLDER ENGAGEMENT LIST

APPENDIX 4A: LIST OF PRIVATE SECTOR STAKEHOLDERS ENGAGED FOR IN-DEPTH INTERVIEWS

For references, the key private sector stakeholder categories in Table A4.1 are:

1. **Resin Producers:** Resin producers produce virgin resin (e.g. PET, PP, PE) from crude oil that is used as feedstock for production of plastic goods.
2. **Converters:** Converters use the resin produced by resin producers, and in some cases recycled resins produced by recyclers, to manufacture plastic products.
3. **Collectors:** Collectors are formal waste management companies and informal workers who collect the plastic products after consumption to re-sell for recycling.
4. **Aggregators:** Aggregators collect large quantities of post-consumer or post-industrial plastics from their supply chain (consisting of collectors and junk shops) to re-sell to recyclers.
5. **Processors and Recyclers:** Processors and Recyclers convert the waste plastics collected by the collectors and aggregators and convert them into the recycled raw material.

Table A4.1.
LIST OF PRIVATE SECTOR STAKEHOLDERS ENGAGED FOR IN-DEPTH INTERVIEWS

#	Stakeholder name	Stakeholder category	Name of contact person	Position
1	Association of Flexible Packaging Manufacturers of the Philippines (AFPM)	Industry Association	Mario Estrada	Spokesperson
2	Association of Petrochemical Manufacturers of the Philippines, Inc. (APMP)	Industry Association	Homer Maranan	Executive Director
3	AUDEO Manufacturing	Recycler	Danielle Ralleca	President
4	Business for Sustainable Development (BSD)	Industry Association	Bonar Laureto	Managing Director
5	Coca-Cola Philippines	Brand	Jonah De Lumen-Pernia	Director-Public Affairs & Communications
6	Cofta Mouldings Corporation	Converter	John Tan	No position available
7	Cygnus Industries, Inc.	Converter	Arnold Chan	President
8	Envirotech Waste Recycling Inc.	Recycler	Winchester Lemen	Founder
9	Filpet, Inc.	Converter	Jericson Co	No position available
10	Geocycle Philippines	Waste Co-processor	Jon Alan Cuyno	New Developments Project Manager
11	Geoplast Corporation	Recycler	Walter Sy	General Manager
12	Green Antz Builders, Inc	Recycler	Rommel Benig	President
13	Indorama Ventures Packaging (Philippines) Corporation	Recycler	Vikas Gupta	Director of Operations
14	IPM Waste Management Pasig	Waste Collector	Eleanor Ang	No position available
15	JG Summit Holdings, Inc.	Conglomerate	Yvonne Flores	Director of Sustainability and CSR

16	JG Summit Petrochemical Corporation	Resin Producer	Silvestre Yraola III	Marketing Communications & Research Manager
17	Linis Ganda	Junkshop Network	Joey De Jesus	No position available
18	Manly Plastics Inc. + Sentinel Plastic Manufacturing Corporation	Convertor & Recycler	Vicente Co	VP Sales and Marketing
		Convertor & Recycler	Jonathan Co	Sales and Marketing Manager
19	Nestlé Philippines	Brand	Misha Rabat	Corporate Affairs Executive
20	New Foundland Plastic Manufacturing Corporation + Yi Lu Jia Plastics	Recycler	Maverick Ronon	No position available
21	Packaging Institute of the Philippines (PIP)	Industry Association	Stefano Paolo Bunag	President
22	PepsiCo Philippines	Brand	Annemarie Corominas	Head Public Policy
23	Philippine Alliance for Recycling and Materials Sustainability (PARMS)	Industry Alliance	Crispian Lao	President
			Bert Guevarra	NGO representative
24	Philippine Plastics Industry Association, Inc. (PPIA)	Industry Association	Danny Go	President
25	Philippine Spring Water Resources, Inc.	Converter & Brand	Michael Embestro	Marketing Director
26	Plastic Bank	Social enterprise/ Aggregator	Paolo Miguel DeLos Reyes	Customer & Partnership Manager
27	Plastic Credit Exchange (PCEx)	NGO/Aggregator	Nanette Medved-Po	Founder
28	Reinheart Marketing	Recycler	Efren Go	CEO
29	Republic Cement	Waste Co-processor	Nabil Francis	Director
30	The Plastic Flamingo	Recycler	Louise Etchepare	Partnership and development manager
31	Toplun Plastic Corporation	Recycler	Patrick Edwin Lee	Director
32	Unilever Philippines	Brand	Ed Sunico	VP Communications - South East Asia
33	W2Worth Innovations	Waste-to-energy	Jill Boughton	President & CEO

APPENDIX 4B: LIST OF GOVERNMENT OR OTHER STAKEHOLDERS ENGAGED FOR IN-DEPTH INTERVIEWS

Table A4.2.
LIST OF GOVERNMENT OR OTHER STAKEHOLDERS ENGAGED FOR IN-DEPTH INTERVIEWS

#	Stakeholder name	Stakeholder category	Name of contact person	Position
1	AMH Philippines, Inc.	Company (Energy Consultancy)	Benedict Requejo	Engineer
2	Delegation of the European Union to the Philippines	Delegation	Giovanni Serritella	Attache, Manager for Environment and Climate Change
3	Department of Environment and Natural Resources (DENR)	Government (National)	Joan Flores	EMS

4	Department of Environment and Natural Resources - Environmental Management Bureau (DENR-EMB)	Government (National)	Ma. Delia Cristina M. Valdez	Officer in Charge - Chief, Solid Waste Management Division
5	Department of Finance - Bureau of Customs	Government (National)	Rowena Matienzo	Acting Chief, PMID
6	Department of Science and Technology (DOST)	Government (National)	Annabelle Briones	Director
7	National Economic and Development Authority (NEDA)	Government (National)	Nieva T. Natural	Director
8	National Solid Waste Management Commission	Government (National)	Crispian Lao	Vice Chair
9	Philippine Statistics Authority (NEDA - PSA)	Government (National)	Helen Grace Maranan	Statistical Specialist I
10	Quezon City	Government (Local)	Richard Santuille	Action officer, Task Force - Solid Waste Management
11	UN-Habitat, Healthy Oceans and Clean Cities Initiative - Philippines	United Nations Programme	Voltaire Acosta	Project Manager
12	University of the Philippines	Institution	Dr. Maria Antonia Tanchuling	Professor at the Institute of Civil Engineering
			Ma. Brida Lea Diola	Faculty Member at the College of Engineering
13	USAID - Clean Cities, Blue Ocean	International Development Agency	Eric DesRoberts	Global Engagement Director
14	WWF Philippines	NGO	Czarina Constantino	National Lead for No Plastics in Nature

APPENDIX 4C: ATTENDEE LIST OF STAKEHOLDER CONSULTATION WORKSHOP

Table A4.3.
ATTENDEE LIST OF STAKEHOLDER CONSULTATION WORKSHOP

#	Company	Stakeholder Category	Full Name	Position
1	Association of Flexible Packaging Manufacturers of the Philippines (AFPM)	Industry Association	Mario Estrada	Spokesperson
2	Association of Petrochemical Manufacturers of the Philippines (APMP)	Industry Association	Homer Maranan	Executive Director
3	BASF	Company (Petrochemical)	Ronald Mercado	Managing Director
4	Business for Sustainable Development (BSD)	Industry Association	Bonar Laureto	Managing Director
5	Coca-Cola Philippines	Company (Consumer Goods)	Jonah De Lumen-Pernia	Director of Public Affairs and Communications
6	Department of Environment and Natural Resources (DENR)	Govt (National)	Joan Flores	EMS
7	Department of Environment and Natural Resources (DENR)	Govt (National)	Marcial C. Amaro Jr.	Assistant Secretary
8	Department of Finance (DOF)	Govt (National)	Jayson B. Matienzo	No position available
9	Department of Finance (DOF)	Govt (National)	Carlo-Angelo Reodica	No position available

10	Department of Trade and Industry (DTI) - Bureau of Import Services	Govt (National)	Carmelo S. Nicolas	Chief of BIS - Import Facilitation Division
11	Department of Trade and Industry (DTI) - Bureau of Import Services	Govt (National)	Catherine I. Salvador	Trade-Industry Development Specialist
12	Department of Trade and Industry (DTI) - Board of Investment	Govt (National)	Evariste Cagatan	Director, Manufacturing Industries Service
13	Envirotech Waste Recycling Inc.	Company (Recycler)	Winchester Lemen	Founder
14	Filpet, Inc.	Company (Converter)	Jericson Co	Business Development
15	Geocycle Philippines	Company (Waste Co-processor)	Jon Alan Cuyno	New Developments Project Manager
16	Green Antz Builders, Inc.	Company (Recycler)	Saar Herman	Senior Consultant
17	Indorama Polyester Industries (Nakhon Pathom)	Company (Recycler)	Upendra Shah	Assistant Vice President
18	Indorama Ventures Packaging (Myanmar) Limited	Company (Recycler)	Sudeep Jain	Vice President
19	Indorama Ventures Packaging (Philippines) Corporation	Company (Recycler)	Maneesh Gupta	Country Head
20	Indorama Ventures Packaging (Philippines) Corporation	Company (Recycler)	Vikas Gupta	Director of Operations
21	Indorama Ventures Packaging (Philippines) Corporation	Company (Recycler)	Anivesh Tewari	Head of Operations (PET Recycling – Asia)
22	IPM Pasig Waste Management	Company (Waste Collector)	Ellen Ang	Project Manager
23	JG Summit Holdings, Inc.	Conglomerate	Elvie Abanilla	Sustainability Officer
24	JG Summit Holdings, Inc.	Conglomerate	Yvonne Flores	Director of Sustainability and CSR
25	JG Summit Petrochemical Corporation	Company (Resin Producer)	Elsie M. David	Assistant Vice President for Market and Product Development
26	Manly Plastics	Company (Converter/ Recycler)	Jonathan Co	Sales and Marketing Manager
27	National Economic and Development Authority (NEDA)- ANRES	Govt (National)	Jane Desiree Andal	Supervising EDS
28	National Economic and Development Authority (NEDA)- ANRES	Govt (National)	Mary Descery Joy Bongcac	Senior EDS
29	National Economic and Development Authority (NEDA)- ANRES	Govt (National)	Lara Gianna Hidalgo	EDS II
30	National Solid Waste Management Commission (NSWMC)	Govt (National)	Emelita Aguinaldo	Former Executive Director
31	Nestlé Philippines	Company (Consumer Goods)	Misha Rabat	Assistant Vice President
32	Nestlé Philippines	Company (Consumer Goods)	Maria Christine Ponce-Garcia	Assistant Vice President, Corporate Affairs Executive
33	New Foundland Plastic Manufacturing Corporation/ Yi Lu Jia Plastics	Company (Recycler)	Kevin Go	Owner

34	Packaging Institute of the Philippines (PIP)	Industry Association	Stefano Paolo Bunag	President
35	PepsiCo Philippines	Company (Consumer Goods)	Anne Marie Corominas	Head of Public Policy
36	Philippine Alliance for Recycling and Materials Sustainability (PARMS)	Industry Association	Crispian Lao	President
37	Philippine Statistics Authority (PSA)	Govt (National)	Mylene M. Evangelista	Statistical Specialist II
38	Plastic Bank	Social Enterprise/ Aggregator	Paolo Miguel DeLos Reyes	Customer & Partnership Manager
39	Plastic Credit Exchange	NGO/Aggregator	Nanette Medved Po	Founder
40	Republic Cement	Company (Co-Processor)	Angela D. Edralin Valencia	Ecoloop Managing Director
41	UN-Habitat, Healthy Oceans and Clean Cities Initiative - Philippines	Multilateral/Development Agency	Voltaire Acosta	Project Manager
42	Unilever Philippines	Company(Consumer Goods)	Ed Sunico	VP Communications - South East Asia
43	USAID - Clean Cities, Blue Ocean	Multilateral/Development Agency	Renerio Acosta	Asia Regional Director
44	World Wildlife Fund (WWF) Philippines	NGO/Foundation	Czarina Constantino	National Lead for No Plastics in Nature
45	W2Worth Innovations	Waste-to-energy	Theresa	No position available
46	International Finance Corporation (IFC)	International Organisation	Navneet Chadha	Sustainability Professional
47	World Bank	International Organisation	Agnes Chung Balota	Environmental Specialist
48	World Bank	International Organisation	Dr. Anjali Acharya	Senior Environmental Specialist
49	World Bank	International Organisation	Kate Almora Philp	Environmental Engineer
50	World Bank	International Organisation	Venessa Vaishali Sarkar	HR Assistant
51	GA Circular	Consultant for the Philippines' Plastics Circularity Project	Ashwin Subramaniam	Founder & CEO
52	GA Circular		Laura Allen	Co-founder & COO
53	GA Circular		Tam Nguyen	Head of Operations
54	GA Circular		Paolo Facco	Project Manager
55	GA Circular		Amita Baecker	Project Manager
56	GA Circular		Judy Ascalon	Philippines-based Consultant
57	GA Circular		Joshua Tan	Project Executive
58	GA Circular		Thao Pham	Project Executive
59	GA Circular		Samantha Phillips	Project Executive
60	GA Circular		Juline Lew	Project Executive

APPENDIX 5:

METHODOLOGICAL DIFFERENCES BETWEEN THIS WORLD BANK STUDY AND WWF EPR STUDY

Table A5.1.
SIMILARITY AND DIFFERENCE OF METHODOLOGY USED IN WORLD BANK MFA AND WWF MFA

#	Methodology Areas	MFA under Market Study by World Bank - by GA Circular	WWF EPR Study
1	Key Objective	To define the addressable market size in terms of tonnes and market value in plastics circularity in the Philippines. To identify the barriers and opportunities for plastics recycling.	To assess the status quo of the waste management system and plastic packaging material flows and recommend a relevant Extended Producer Responsibility (EPR) scheme for the Philippines.
2	Materials Studied	MFA covers plastics from production until post-consumption for all products under the four key resins (PET, PP, HDPE, LDPE/ LLDPE), and provides a high-level overview of multilayer flexibles.	MFA covers the post-consumption phase of the six key resins, and other plastics (e.g. PET, HDPE, PVC, LDPE, PP, PS, other plastics).
3	Data Collection	The methodology uses in-depth stakeholder interviews with 45 public and private sector stakeholders from resin producers, convertors and recyclers and additional consultation with more stakeholders.	Stakeholder consultations were conducted with the plastics industry, government entities and NGOs. Limited engagement with recyclers on recycling capacities and recycling rates.
	Key Similarities	• Both MFAs focus on four of the key plastic resins (PET, HDPE, LDPE, and PP) • Both MFAs factor in resin and semi-finished product imports/exports	
	Key Methodological Differences	Resin production figures for 2019 are based on 2019 production figures. The Collected-for-Recycling (CFR) rates are based on in-depth interviews with recyclers which included information on recycling capacity and estimated recycling rates. The recycling rates have been triangulated based on known and estimated recycling capacities and utilization in addition to factoring net scrap plastic exports. The CFR tonnages and percentages/rates are based on the definition of CFR, which accounts for all plastic collected locally and sent for recycling—both local recycling and locally collected material that is sent overseas for recycling.	Resin production figures for 2019 are estimated based on 2018 production figures. The WWF study includes finished products, with some uncertainty associated with the numbers used. Mass balance calculations used for recycling rates (and for other data points where data was not available), resulting in uncertainty. The WWF study considers local recycling only in reporting the recycling rate—it does not factor in locally collected material which is collected for recycling but sent overseas to be recycled.
4	Type of Plastic Product	Covers all plastic products produced from the four key resins studied. Includes lifespan of products and accounts for future disposal and disposal in 2019 from previous years' consumption.	All plastic products, components, or packaging that falls within the seven plastics resins.

APPENDIX 6:

NET RESIN IMPORT/EXPORT AND NET SEMI-FINISHED PRODUCT IMPORT/EXPORT

APPENDIX 6A: HS CODES USED FOR NET RESIN IMPORT/EXPORT AND NET SEMI-FINISHED PRODUCT IMPORT/EXPORT CALCULATIONS

Table A6.1 lists the HS codes used to calculate the net resin import/export and net semi-finished product import/export volumes. The HS codes indicating primary form were used to calculate the net resin import/export whereas those indicating semi-finished products were used to calculate the net semi-finished product import export.

Table A6.1.
HS CODES USED TO CALCULATE THE NET RESIN IMPORT/EXPORT AND NET SEMI-FINISHED PRODUCT IMPORT/EXPORT VOLUMES

	HS Codes used	NEDA- PSA (2019)		PPIA (2019) Source: NEDA-PSA
		Export (tonnes)	Import (tonnes)	Import (tonnes)
PET		**8,464**	**203,935**	
In primary forms	390760, 390761, 39076910	249	162,230	160,229
Semi-finished Product	392062	8,216	41,705	
PE		**179,688**	**471,450**	
In primary forms	390110, 390120, 390130, 390190	69,593	411,184	401,826
Semi-finished Product	391610, 391721, 391890, 391910, 392010, 392321, 482390	28,839	56,969	
PP		**72,462**	**249,903**	
In primary forms	390210, 390230, 390290	69,742	219,937	307,762[5]
Semi-finished Product	391722, 392020, 3921192015, 3921102019, 540234, 540248, 540253, 540263, 540412, 550140, 550340, 550640, 560130	2,720	29,966	
PET Polyester		**440**	**119,884**	
In primary forms	Estimated by assuming 58.06% of PET in 390769 is fiber and considering proportion of only virgin PET in 390769	0	0	
Semi-finished Product	392063, 392069, 540220, 540233, 540246, 540247 540252, 540262, 540710 540751, 540752, 540753 540754, 540761, 540769 550120, 550320, 550620	440	119,884	

5 In the case of PP, PPIA has also included the Propylene monomer import into the calculation. The use of this figure gives a total PP consumption of 478,400 tonnes/year. Based on interviews with petrochemical industry stakeholders their perception of the total PP consumption in the country is in the range of 400,000-500,000 tonnes/year. Therefore, the study team has decided to use the PPIA value only in the case of PP.

Table A6.2 provides the descriptions of the HS codes used above. The 2015PSCC or 2015 Philippine Standard Commodity Classification (PSCC) refers to the latest revision of the country's classification of all commodities on imports and exports being used for tariff and statistical purposes.

Table A6.2.
HS CODES USED AND ITS RESPECTIVE DESCRIPTION

HS Code	PSCC2015	HS Description	Type of Resin	Primary form/ Semi-finished Product/ Waste
390110		**Polyethylene having a specific gravity of less than 0.94 (TNE)**	**PE**	**Primary**
39011012	3901101200	Linear low density polyethylene in liquid or paste form (TNE)	LLDPE	Primary
39011019	3901101900	Other polyethylene of specific gravity below 0.94 in liquid or paste form (TNE)	LDPE	Primary
39011092	3901109201	Linear low density polyethylene in other primary forms (TNE): in powder form	LLDPE	Primary
	3901109202	Pharmaceutical grade, granules		
	3901109203	Cable grade, granules		
	3901109204	Used in manufacture of telephonic or electric wires		
	3901109209	Other		
39011099	3901109901	Other polyethylene of specific gravity below 0.94 in other primary forms (TNE): in powder form	LDPE	Primary
	3901109902	Pharmaceutical grade, granules		
	3901109903	Cable grade, granules		
	3901109904	Used in manufacture of telephonic or electric wires		
	3901109909	Other		
390120		**Polyethylene of specific gravity 0.94 or more (TNE)**	**PE**	**Primary**
	3901200001	In powder form		
	3901200002	Pharmaceutical grade, granules		
	3901200003	Cable grade, granules		
	3901200004	Used in manufacture of telephonic or electric wires		
	3901200009	Other		
390130		**Ethylene polymers in primary forms, ethylene-vinyl acetate copolymers**	**PE**	**Primary**
	3901300001	In powder form		
	3901300002	In liquids or pastes		
	3901300003	In granules		
	3901300009	Other		
390140		**Polymers of ethylene in primary forms, ethylene-alpha-olefin copolymers having a specific gravity of less than 0.94**	**PE**	**Primary**
	3901400010	In dispersion		
	3901400090	Other than in dispersion		
390190		**Ethylene polymers in primary forms, n.e.c. in heading no. 3901**	**PE**	**Primary**

39019040	3901904000	In dispersion		
39019090	3901909001	In powder form		
	3901909002	In liquids or pastes		
	3901909003	In granules		
	3901909009	Other		
390210		**Propylene, other olefin polymers, polypropylene in primary forms**	**PP**	**Primary**
390210	3902103000	In dispersion		
	3902109001	In powder form		
	3902109002	Used in manufacture of telephonic or electric wires		
	3902109003	Liquids or paste		
	3902109009	Other		
390230		**Propylene copolymers in the form of liquids or pastes**	**PP**	**Primary**
39023030	3902303000	In the form of liquids or pastes		
39023090	3902309001	In powder form		
	3902309002	Used in manufacture of telephonic or electric wires		
	3902309009	Other		
390290		**Propylene, other olefin polymers, n.e.s in heading no. 3902, in primary forms**	**PP**	**Primary**
	3902901000	Chlorinated polypropylene used for printing ink formulation (TNE)		
39029090	3902909001	In powder form		
	3902909002	In liquids or pastes		
	3902909003	In granules		
	3902909009	Other		
390760		**Polyethylene terephthalate in primary forms**	**PET**	**Primary**
390761		**Polyethylene terephthalate in primary forms, having a viscosity of 78 ml/g or higher (TNE)**	**PET**	**Primary**
390769		**Poly(ethylene terephthalate) in primary forms, having a viscosity of less than 78ml/g**	**PET**	**Primary**
39076910	3907609001	Other poly(ethylene terephthalate) in the form of granules (TNE)		
39076990	3907609009	Other poly(ethylene terephthalate) excl those in the form of granules (TNE)		
391610		**Polymers of ethylene**	**PE**	**Semi-finished Product**
39161010	3916101000	Monofilament of ethylene polymers of which cross-sectional dimension exceeds 1mm (TNE)		
3916102000	3916102001	Rods sticks and profile shapes of ethylene polymers (TNE)		
	3916102002			
	3916102009			
391721		**Plastic tubes, pipes and hoses: rigid, of polymers of ethylene**	**PE**	**Semi-finished Product**
39172100	3917210001	Porous tubes suitable for agricultural watering		

	3917210009	Other		
391722		**Plastic tubes, pipes and hoses: rigid, of polymers of propylene**	**PP**	**Semi-finished Product**
39172200	3917220001	Porous tubes suitable for agricultural watering		
	3917220009	Other		
391890		**Floor, wall or ceiling coverings of plastics (excluding polymers of vinyl chloride), whether or not self-adhesive, in rolls or in the form of tiles**	**PE**	**Semi-finished Product**
39189011	3918901100	Floor tiles of polyethylene (TNE)		
39189013	3918901300	Other floor coverings of polyethylene (TNE)		
39189091	3918909100	Wall or ceiling coverings of polyethylene (TNE)		
391910		**Self-adhesive plates, sheets, film, foil, tape strip and other flat shapes of polyethylene in rolls no wider than 200mm (TNE)**	**PE**	**Semi-finished Product**
39191020	3919102001	Tapes used in the manufacture of telephonic or electric wires		
	3919102009	Other		
392010		**Plastic plates, sheets, film, foil and strip of polymers of ethylene, non-cellular and not reinforced, supported or similarly combined with other materials**	**PE**	**Semi-finished Product**
39201011	3920100001	Rigid plates and sheets of polymers of ethylene, non-cellular and not reinforced laminated supported or combined with other materials (TNE)		
39201019	3920100009	Non rigid plates and sheets of polymers of ethylene, non-cellular and not reinforced laminated supported or combined with other materials (TNE)		
39201090		Film, foil and strip of polymers of ethylene, non-cellular and not reinforced laminated supported or combined with other materials (TNE)		
392020		**Plastic polymers of propylene, plates, sheets, film, foil and strip, non-cellular and not reinforced, laminated, supported or similarly combined with other materials**	**PP**	**Semi-finished Product**
39202010	3920201000	Biaxially oriented polypropylene film, non-cellular and not reinforced laminated supported or combined with other materials (TNE)		
39202091	3920209001	Other plates and sheets of polymers of propylene, non-cellular and not reinforced laminated supported or combined with other materials (TNE)		
39202099	3920209002	Other film foil and strip of polymers of propylene, non-cellular and not reinforced laminated supported or combined with other materials (TNE)		
	3920209003			
	3920209009			
392062		**Plastic plates, sheets, fil, foil and strip, of PET, non-cellular and not reinforced, laminated, supported or similarly combined with other materials**	**PET**	**Semi-finished Product**
39206210	3920620001	Plates and sheets of poly(ethylene terephthalate), non-cellular and reinforced laminated supported or combined with other materials (TNE)		
39206290	3920620002	Film, foil and strips of poly(ethylene terephthalate), non-cellular and reinforced laminated supported or combined with other materials (TNE)		

	3920620009			
392063		**Plastics plates, sheets, film, foil and strip, of unsaturated polyesters, non-cellular and not reinforced, laminated, supported or similarly combined with other materials**	**Polyester**	**Semi-finished Product**
	3920630001	Used as an adhesive by melting		
	3920630009	Other		
392069		**Plastics plates, sheets, film, foil and strip (not self-adhesive), of polyesters, n.e.c. in heading no. 3920, non-cellular and not reinforced, laminated, supported or similarly combined with other materials**	**Polyester**	**Semi-finished Product**
	3920690001	Used as an adhesive by melting		
	3920690009	Other		
392119		**Plastics plates, sheets, film, foil and strip, of plastics, n.e.s. in heading no. 3921, cellular**	**PP**	**Semi-finished Product**
3921192015		Other plates, sheets, film, foil and strip, of plastics other than of polymers of styrene, of polymers of vinyl chloride, of polyurethanes and of regenerated cellulose; rigid, of other addition polymerization products plates and sheets, of polypropylene		
3921192019		Other plates, sheets, film, foil and strip, of other plastics; rigid, of other addition polymerization products other than plates and sheets, of polypropylene		
392321		**Ethylene polymers, sacks and bags (including cones), for the conveyance or packing of goods**	**PE**	**Semi-finished Product**
39232111	3923211100	Aseptic bags of ethylene polymers reinforced with aluminum foil of width 315mm or more and length 410mm or more incorporating a sealed gland		
39232119	3923211900	Other aseptic bags of ethylene polymers reinforced with aluminum foil		
39232191	3923219100	Aseptic bags of ethylene polymers not reinforced with aluminum foil of width 315mm or more and length 410mm or more incorporating a sealed gland		
39232199	3923219900	Sacks and other aseptic bags of ethylene polymers not reinforced with aluminum foil		
48239030	**4823903000**	**Die cut polyethylene coated paperboard used for making paper cups**	**PE**	**Semi-finished Product**
540234	**5402340000**	**Textured polypropylene yarn not for retail (kgm)**	**PP**	**Semi-finished Product**
540244		**Yarn, synthetic, filament, monofilament (less than 67 decitex), other than high tenacity or textured yarn, elastomeric, single, untwisted or twisted 50 turns or less per meter, not for retail sale, not sewing thread**	**Polyester**	**Semi-finished Product**
540244100	5402440000	Synthetic filament yarn (other than sewing thread), not put up for retail sale, including synthetic monofilament of less than 67 decitex. other yarn, single, untwisted or with a twist not exceeding 50 turns per meter elastomeric of polyesters		
540248	**5402480000**	**Other polypropylene yarn single untwisted or a twist not over 50 turns per meter not for retail (kgm)**	**PP**	**Semi-finished Product**
540253	**5402591000**	**Other polypropylene yarn single with a twist over 50 turns per meter not for retail (kgm)**	**PP**	**Semi-finished Product**

540263	5402691000	Other polypropylene yarn multiple or cabled not for retail (kgm)	PP	Semi-finished Product
540412	5404120000	Polypropylene monofilament of 67 decitex or more & no cross-sectional dimension exceeds 1mm (kgm)	PP	Semi-finished Product
540710		Fabrics, woven; from high tenacity yarn, of nylon, other polyamides or of polyesters	Polyesters	Semi-finished Product
54071021	5407102001	Woven tire fabrics and conveyor duck of high tenacity yarn of nylon or other polyamides or polyesters unbleached (MTK)		
54071029	5407102009	Woven tire fabrics and conveyor duck of high tenacity yarn of nylon or other polyamides or polyesters not unbleached (MTK)		
54071091	5407109001	Other woven fabrics of high tenacity yarn of nylon or other polyamides or polyesters unbleached (mtk)		
54071099	5407109009	Other woven fabrics of high tenacity yarn of nylon or other polyamides or polyesters not unbleached (mtk)		
540751		Fabrics woven, containing 85% or more by weight of textured polyester filaments, unbleached/bleached	Polyester	Semi-finished Product
	5407510001	Fabrics woven, containing 85% or more by weight of textured polyester filaments, unbleached/bleached		
	5407510009	Other		
540752	5407520000	Fabrics woven, containing 85% or more by weight of textured polyester filaments, dyed	Polyester	Semi-finished Product
540753	5407530000	Fabrics woven, containing 85% or more by weight of textured polyester filaments, of yarns of different colors	Polyester	Semi-finished Product
540754	5407540000	Fabrics woven, containing 85% or more by weight of textured polyester filaments, printed	Polyester	Semi-finished Product
540761		Fabrics woven, containing 85% or more by weight of non-textured polyester filaments	Polyester	Semi-finished Product
54076110	5407610001	Taffeta (including umbrella cloth)		
	5407610009	Other		
540769		Fabrics woven, containing less than 85% by weight of non-textured polyester filaments	Polyester	Semi-finished Product
54076910	5407690000	Unbleached/Bleached		
540220	5402200000	Yarn;(not sewing thread), high tenacity yarn of polyesters (including synthetic monofilament of less than 67 decitex), not put up for retail sale	Polyester	Semi-finished Product
540233	5402330000	Yarn textured, (not sewing thread), of polyesters (including synthetic monofilament of less than 67 decitex), not put up for retail sale	Polyester	Semi-finished Product
540246	5402460000	Yarn synthetic, filament, monofilament (less than 67 decitex), of polyesters (not high tenacity or textured), partially oriented, single, untwisted or twisted 50 turns or less per meter, not for retail sale, not sewing thread	Polyester	Semi-finished Product
540247	5402470000	Yarn synthetic, filament, monofilament (less than 67 decitex), polyesters (not high tenacity or textured), not partially oriented, single, untwisted or twisted 50 turns or less per meter, not for retail sale, not sewing thread	Polyester	Semi-finished Product
540252	5402520000	Yarn (not sewing thread), single, of polyesters (including synthetic monofilament of less than 67 decitex), with a twist exceeding 50 turns per meter, not put up for retail sale, not textured, not high tenacity	Polyester	Semi-finished Product

540262	5402620000	Yarn (not sewing thread), multiple (folded) or cabled, of polyesters (including synthetic monofilament of less than 67 decitex), not put up for retail sale, not textured, not high tenacity	Polyester	Semi-finished Product
550120	5501200000	Fibers synthetic filament tow, of polyesters	Polyester	Semi-finished Product
550140	5501400000	Synthetic filament tow of polypropylene (kgm)	PP	Semi-finished Product
550320	5503200000	Fibers synthetic staple fibers, of polyesters, not carded, combed or otherwise processed for spinning	Polyester	Semi-finished Product
550340	5503400000	Synthetic staple fibers not carded combed or otherwise processed for spinning of polypropylene (kgm)	PP	Semi-finished Product
550620	5506200000	Fibers synthetic staple fibers, of polyesters, carded, combed or otherwise processed for spinning	Polyester	Semi-finished Product
550640	5506900000	Synthetic staple fibers carded combed or otherwise processed for spinning of polypropylene (kgm)	PP	Semi-finished Product
56013020	5601302000	Polypropylene fiber flock	PP	Semi-finished Product

APPENDIX 6B: COMPARISON OF IMPORT/EXPORT DATA FROM VARIOUS SOURCES

The import and export data used in World Bank MFA is mainly sourced from NEDA-PSA. The differences of resin and product import-export amounts between NEDA-PSA data, UN Comtrade data and PPIA data are summarized in Table A6.3a to A6.3c.

Resin and Product Import

Table A6.3a.
IMPORT DATA FROM VARIOUS SOURCES

	Resin Import			Product Import	
Resin	NEDA-PSA	UN Comtrade (PH as reporting for imports)	PPIA	NEDA-PSA	UN Comtrade (PH as reporting for imports)
PET	162,230	133,091	160,229	41,705	40,332
Polyester	0	0	-	119,884	78,713
PP	219,937	72,274	307,762	29,966	29,325
PE	411,184	196,399	401,826	56,969	98,735

Resin and Product Export

Table A6.3b.
EXPORT DATA FROM VARIOUS SOURCES

	Resin Export			Product Export		
Resin	NEDA-PSA	UN Comtrade (World as reporting for imports)	UN Comtrade (PH as reporting for exports)	NEDA-PSA	UN Comtrade (World as reporting for imports)	UN Comtrade (PH as reporting for exports)
PET	249	8,205	2,634	8,216	3,939	8,085
Polyester	0	0	0	440	267	372
PP	69,742	58,846	76,522	2,720	6,254	2,529
PE	69,593	26,269	57,895	28,839	29,034	29,369

Net Resin and Product Import - Export

Table A6.3c.
COMPARISON OF IMPORT/EXPORT DATA FROM VARIOUS SOURCES

Resin	Net Resin Import - Export			Net Product Import - Export		
	NEDA-PSA	UN Comtrade (World as reporting for imports)	UN Comtrade (PH as reporting for exports)	NEDA-PSA	UN Comtrade (World as reporting for imports)	UN Comtrade (PH as reporting for exports)
PET	161,981	124,886	130,457	33,489	36,393	32,248
Polyester	0	0	0	119,444	78,446	78,341
PP	150,195	13,428	-4,248	27,246	23,071	26,797
PE	341,590	170,131	138,504	28,130	69,701	69,366

Figures indicate the net import-export: a positive number means that the Philippines is a net importer of the particular resin/product, while a negative number means that the Philippines is a net exporter.

APPENDIX 7:

DATA POINTS USED FOR LIFESPAN CALCULATIONS

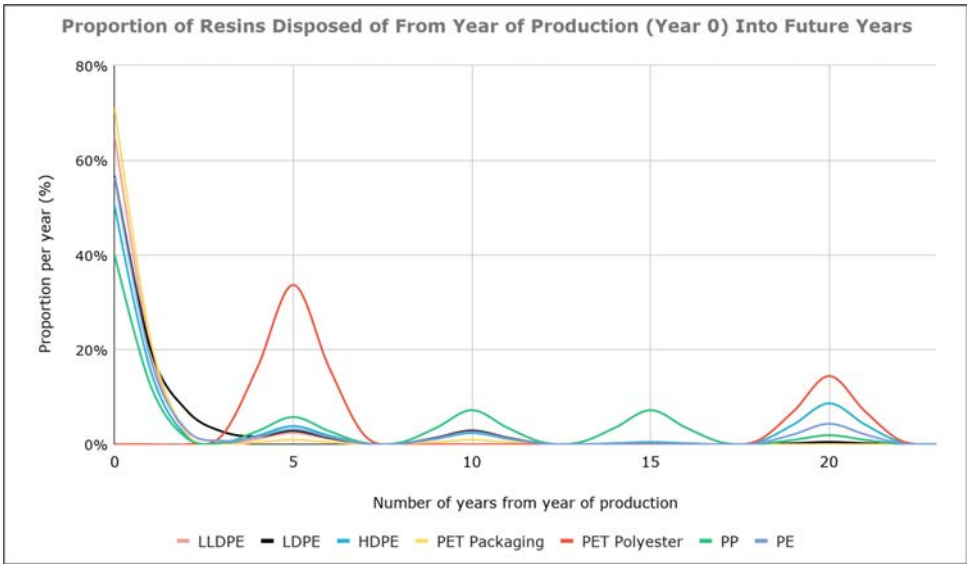
Table A7.1.
DATA POINTS USED FOR LIFESPAN CALCULATIONS

Industry Sector	Mean (Average Lifes-pan)	Standard Deviation (Spread of Disposal)	Material Breakdown									
			LLDPE/LDPE		HDPE		PP		PET Bottle, Sheet & Fil		PET Polyester	
			Tonnes (2019)	Pro-portion (2019)	Tonnes (2019)	Pro-portion (2019)	Tonnes (2019)	Pro-portion (2019)	Tonnes (2019)	Pro-portion (2019)	Tonnes (2019)	Pro-portion (2019)
Packaging	0	0.83	236,130	83%	137,879	60%	187,933	50%	164,227	95%	0	0%
Construc-tion	20	0.83	2,854	1%	41,364	18%	15,035	4%	0	0%	19,693	30%
E&E	10	0.83	17,125	6%	9,192	4%	37,587	10%	3,457	2%	0	0%
Automo-tive	15	0.83	0	0%	2,298	1%	56,380	15%	0	0%	0	0%
Textile	5	0.83	0	0%	0	0%	0	0%	0	0%	45,950	70%
Recreation	10	0.83	0	0%	2,298	1%	18,793	5%	0	0%	0	0%
Footwear	2	0.83	12,727	4%	0	0%	0	0%	0	0%	0	0%
Filament non-textile	0	0.83	0	0%	18,384	8%	11,276	3%	0	0%	0	0%
Medical	0	0.83	1,157	0%	0	0%	3,759	1%	1,729	1%	0	0%
Lens	0	0.83	0	0%	0	0%	0	0%	0	0%	0	0%
Agriculture	5	0.83	10,260	4%	11,490	5%	3,759	1%	0	0%	0	0%
Houseware	5	0.83	2,314	1%	4,596	2%	37,587	10%	1,729	1%	0	0%
Safety	5	0.83	0	0%	0	0%	3,759	1%	1,729	1%	0	0%
Security	5	0.83	0	0%	0	0%	0	0%	0	0%	0	0%
Security	5	0.83	2,854	1%	2,298	1%	0	0%	0	0%	0	0%
Total	-	-	285,422	100%	229,798	100%	375,866	100%	172,871	100%	65,644	100%

Notes:
1. *Source: Plastics Institute of Thailand (for percentage breakdown for end-use industry)*
2. *The breakdown above is used in order to determine 2019 disposal amounts, by determining the amounts consumed in 2019 and kept in use beyond 2019, and the amounts from past years that are being disposed of in 2019.*
3. *Data from the Plastics Institute of Thailand (PIT) has been used to calculate the material breakdown as the Philippines does not have such data available, and PIT data has been deemed the most representative.*

Figure A7.1.

NORMAL DISTRIBUTION CURVES USED SHOWING AVERAGE LIFESPAN OF PLASTIC PRODUCTS FROM DIFFERENT RESINS



Source: Plastics Institute of Thailand (as Philippines specific data was not available), GA Circular modeling

APPENDIX 8:

DATA SOURCES AND KEY ASSUMPTIONS FOR MATERIAL VALUE LOSS CALCULATIONS

PET PACKAGING

Table A8.1.

DATA SOURCES AND KEY ASSUMPTIONS FOR MATERIAL VALUE LOSS CALCULATIONS PET PACKAGING

PET starting data points		
Data Points	**Value**	**Units**
PET Bottle/Sheet Consumption	172,871	TPY
PET Packaging CFR rate (Low Range)	40%	%
PET Packaging CFR rate (High Range)	55%	%
CFR Tonnes Low Range (PET Packaging)	69,148	-
CFR Tonnes High Range (PET Packaging)	95,079	-
Price of MVRP under weighted average best circular scenario[6]	$1,272.95	USD/Tonne

PET Packaging			
	Post-Consumer Destination	**Tonnages**	**Prices (USD)**
Low Range Estimate of Recycling Rate	Food-grade	0	$1,420
	PSF/POY	0	$1,296
	Non-food grade	0	$1,140
	Flakes	69,148	$988
	Not recycled	103,722	0
High Range Estimate of Recycling Rate	Food-grade	0	$1,420
	PSF/POY	0	$1,296
	Non-food grade	0	$1,140
	Flakes	95,079	$988
	Not recycled	77,792	0

PET Packaging						
Post-Consumer Destination		**Tonnage**	**Price (USD/ Tonne)**	**Price difference from MVRP**	**Total Value Lost (Millions USD)**	**Total Lost (Millions USD)**
Low Range Estimate of Recycling Rate	Food-grade	0	$1,420	-$147	$0	$152
	PSF/POY	0	$1,296	-$23	$0	
	Non-food grade	0	$1,140	$133	$0	
	Flakes	69,148	$988	$285	$20	

6 The term Most Valuable Recycled Product (MVRP) for each resin refers to the best circular scenario of the proportion of recycled products that can be produced. The calculation of the price of MVRP uses an average of the prices of various possible recycled products weighted according to the proportions of each type of recycled product under a best-case scenario of maximal value unlocked for the resin. This method takes into consideration that it is not realistic to expect 100% of resins to be recycled into the recycled product which has the most value (e.g. 100% food-grade PET production from post-consumer PET packaging).

Low Range Estimate of Recycling Rate	Not recycled	103,722	$0	$1,273	$132	$152
High Range Estimate of Recycling Rate	Food-grade	0	$1,420	-$147	$0	$126
	PSF/POY	0	$1,296	-$23	$0	
	Non-food grade	0	$1,140	$133	$0	
	Flakes	95,079	$988	$285	$27	
	Not recycled	77,792	$0	$1,273	$99	

PET Packaging								
Post-Consumer Destination		**Post-Consumer Destination (as a % of market inputs)**	**Weighted average price difference from MVRP**	**Price yield (a)**	**Volume yield (b)**	**Value yield (a x b) [Y-AXIS]**	**Collected for recycling rate [X-AXIS]**	**Economic value unlocked [X-AXIS x Y-AXIS]**
Low Range Estimate of Recycling Rate	Food-grade	0.00%	$285	77.62%	93.83%	72.83%	40.00%	29.13%
	PSF/POY	0.00%						
	Non food-grade	0.00%						
	Flakes	100.00%						
	Not recycled							
High Range Estimate of Recycling Rate	Food-grade	0.00%	$285	77.62%	93.83%	72.83%	55.00%	40.06%
	PSF/POY	0.00%						
	Non food-grade	0.00%						
	Flakes	100.00%						
	Not recycled							

PET Packaging				
Post-Consumer Destination		Theoretical max of economic value unlocked Total Lost (Millions USD)	Value unlocked (after factoring in process loss) Total Lost (Millions USD)	Value lost Total Lost (Millions USD)
Low Range Estimate of Recycling Rate	Food grade	$220	$64	$156
	PSF/POY			
	Non-food grade			
	Flakes			
	Not recycled			
High Range Estimate of Recycling Rate	Food grade		$88	$132
	PSF/POY			
	Non-food grade			
	Flakes			
	Not recycled			

PP

Table A8.2.
DATA SOURCES AND KEY ASSUMPTIONS FOR MATERIAL VALUE LOSS CALCULATIONS FOR PP

PP starting data points		
Data Points	Value	Units
PP Consumption	375,866	TPY
PP CFR rate (Low Range)	25%	%
PP CFR rate (High Range)	35%	%
CFR Tonnes Low Range (PP)	43,218	-
CFR Tonnes High Range (PP)	60,505	-
Price of MVRP under weighted average best circular scenario	$993.30	USD/Tonne

PP Packaging			
	Post-Consumer Destination	Tonnages	Prices (USD)
Low Range Estimate of Recycling Rate	Food-grade	0	$1,313
	Natural	18,793	$1,050
	White	18,793	$840
	Colored	23,492	$840
	Black	32,888	$588
	Not recycled	281,900	0
High Range Estimate of Recycling Rate	Food-grade	0	$1,313
	Natural	26,311	$1,050
	White	26,311	$840
	Colored	32,888	$840
	Black	46,044	$588
	Not recycled	244,313	0

PP						
Post-Consumer Destination		Tonnage	Price (USD/ Tonne)	Price difference from MVRP	Total Value Lost (Millions USD)	Total Lost (Millions USD)
Low Range Estimate of Recycling Rate	Food-grade	0	$1,313	-$319	$0	$299
	Natural	18,793	$1,050	-$57	-$1	
	White	18,793	$840	$153	$3	
	Colored	23,492	$840	$153	$4	
	Black	32,888	$588	$405	$13	
	Not recycled	281,900	$0	$993	$280	
High Range Estimate of Recycling Rate	Food-grade	0	$1,313	-$319	$0	$269
	Natural	26,311	$1,050	-$57	-$1	
	White	26,311	$840	$153	$4	
	Colored	32,888	$840	$153	$5	
	Black	46,044	$588	$405	$19	
	Not recycled	244,313	$0	$993	$243	

PP								
Post-Consumer Destination		Post-Consumer Destination (as a % of market inputs)	Weighted average price difference from MVRP	Price yield (a)	Volume yield (b)	Value yield (a x b) [Y-AXIS]	Collected for recycling rate [X-AXIS]	Economic value unlocked [X-AXIS x Y-AXIS]
Low Range Estimate of Recycling Rate	Food-grade	0.00%	$200	79.92%	97.00%	77.52%	25.00%	19.38%
	Natural	20.00%						
	White	20.00%						
	Colored	25.00%						
	Black	35.00%						
	Not recycled							
High Range Estimate of Recycling Rate	Food-grade	0.00%	$200	79.92%	97.00%	77.52%	35.00%	27.13%
	Natural	20.00%						
	White	20.00%						
	Colored	25.00%						
	Black	35.00%						
	Not recycled							

PP				
Post-Consumer Destination		Theoretical max of economic value unlocked Total Lost (Millions USD)	Value unlocked (after factoring in process loss) Total Lost (Millions USD)	Value lost Total Lost (Millions USD)
Low Range Estimate of Recycling Rate	Food-grade	$373	$72	$301
	Natural			
	White			
	Colored			
	Black			
	Not recycled			
High Range Estimate of Recycling Rate	Food-grade		$101	$272
	Natural			
	White			
	Colored			
	Black			
	Not recycled			

HDPE

Table A8.3.
DATA SOURCES AND KEY ASSUMPTIONS FOR MATERIAL VALUE LOSS CALCULATIONS FOR HDPE

HDPE starting data points		
Data Points	Value	Units
HDPE Consumption	229,798	TPY
HDPE CFR rate (Low Range)	25%	%
HDPE CFR rate (High Range)	35%	%
CFR Tonnes Low Range (HDPE)	43,218	-
CFR Tonnes High Range (HDPE)	60,505	-
Price of MVRP under weighted average best circular scenario	$1,054.92	USD/Tonne

HDPE			
	Post-Consumer Destination	Tonnages	Prices (USD)
Low Range Estimate of Recycling Rate	Food-grade	0	$1,458
	Natural	11,490	$1,008
	White	11,490	$987
	Colored	14,362	$882
	Black	20,107	$798
	Not Recycled	172,348	0

High Range Estimate of Recycling Rate	Food-grade	0	$1,458
	Natural	16,086	$1,008
	White	16,086	$987
	Colored	20,107	$882
	Black	28,150	$798
	Not Recycled	149,368	0

HDPE						
Post-Consumer Destination		**Tonnage**	**Price (USD/ Tonne)**	**Price difference from MVRP**	**Total Value Lost (Millions USD)**	**Total Lost (Millions USD)**
Low Range Estimate of Recycling Rate	Food-grade	0	$1,458	-$403	$0	$191
	Natural	11,490	$1,008	$47	$1	
	White	11,490	$987	$68	$1	
	Colored	14,362	$882	$173	$2	
	Black	20,107	$798	$257	$5	
	Not Recycled	172,348	$0	$1,055	$182	
High Range Estimate of Recycling Rate	Food-grade	0	$1,458	-$403	$0	$170
	Natural	16,086	$1,008	$47	$1	
	White	16,086	$987	$68	$1	
	Colored	20,107	$882	$173	$3	
	Black	28,150	$798	$257	$7	
	Not Recycled	149,368	$0	$1,055	$158	

HDPE								
Post-Consumer Destination		**Post-Consumer Destination (as a % of market inputs)**	**Weighted average price difference from MVRP**	**Price yield (a)**	**Volume yield (b)**	**Value yield (a x b) [Y-AXIS]**	**Collected for recycling rate [X-AXIS]**	**Economic value unlocked [X-AXIS x Y-AXIS]**
Low Range Estimate of Recycling Rate	Food-grade	0.00%	$156	85.20%	97.00%	82.64%	25.00%	20.66%
	Natural	20.00%						
	White	20.00%						
	Colored	25.00%						
	Black	35.00%						
	Not Recycled							
High Range Estimate of Recycling Rate	Food-grade	0.00%	$156	85.20%	97.00%	82.64%	35.00%	28.93%
	Natural	20.00%						
	White	20.00%						
	Colored	25.00%						
	Black	35.00%						
	Not Recycled							

HDPE				
Post-Consumer Destination		Theoretical max of economic value unlocked Total Lost (Millions USD)	Value unlocked (after factoring in process loss) Total Lost (Millions USD)	Value lost Total Lost (Millions USD)
Low Range Estimate of Recycling Rate	Food-grade	$242	$50	$192
	Natural			
	White			
	Colored			
	Black			
	Not Recycled			
High Range Estimate of Recycling Rate	Food-grade		$70	$172
	Natural			
	White			
	Colored			
	Black			
	Not Recycled			

LDPE

Table A8.4.

DATA SOURCES AND KEY ASSUMPTIONS FOR MATERIAL VALUE LOSS CALCULATIONS FOR LDPE

LDPE starting data points		
Data Points	Value	Units
LDPE Consumption	285,422	TPY
LDPE CFR rate (Low Range)	5%	%
LDPE CFR rate (High Range)	15%	%
CFR Tonnes Low Range (LDPE)	8,644	-
CFR Tonnes High Range (LDPE)	25,931	-
Price of MVRP under weighted average best circular scenario	$879.90	USD/Tonne

LDPE			
	Post-Consumer Destination	Tonnages	Prices (USD)
Low Range Estimate of Recycling Rate	Natural	2,854	$1,008
	White	2,854	$945
	Black/Colored	8,563	$735
	Not recycled	271,151	0
High Range Estimate of Recycling Rate	Natural	8,563	$1,008
	White	8,563	$945
	Black/Colored	25,688	$735
	Not recycled	242,609	0

LDPE						
Post-Consumer Destination		Tonnage	Price (USD/ Tonne)	Price differ-ence from MVRP	Total Value Lost (Millions USD)	Total Lost (Millions USD)
Low Range Estimate of Recycling Rate	Natural	2,854	$1,008	-$128	$0	$239
	White	2,854	$945	-$65	$0	
	Black/Colored	8,563	$735	$145	$1	
	Not recycled	271,151	$0	$880	$239	
High Range Estimate of Recycling Rate	Natural	8,563	$1,008	-$128	-$1	$216
	White	8,563	$945	-$65	-$1	
	Black/Colored	25,688	$735	$145	$4	
	Not recycled	242,609	$0	$880	$213	

LDPE								
Post-Consumer Destination		Post-Con-sumer Desti-nation (as a % of market inputs)	Weighted average price differ-ence from MVRP	Price yield (a)	Volume yield (b)	Value yield (a x b) [Y-AXIS]	Collect-ed for recycling rate [X-AXIS]	Econom-ic value unlocked [X-AXIS x Y-AXIS]
Low Range Estimate of Recycling Rate	Natural	20.00%	$48	94.51%	97.00%	91.68%	5.00%	4.58%
	White	20.00%						
	Black/ Colored	60.00%						
	Not recycled							
High Range Estimate of Recycling Rate	Natural	20.00%	$48	94.51%	97.00%	91.68%	15.00%	13.75%
	White	20.00%						
	Black/ Colored	60.00%						
	Not recycled							

LDPE				
Post-Consumer Destination		Theoretical max of economic value unlocked Total Lost (Millions USD)	Value unlocked (after factoring in process loss) Total Lost (Millions USD)	Value lost Total Lost (Millions USD)
Low Range Estimate of Recycling Rate	Natural	$251	$12	$240
	White			
	Black/Colored			
	Not recycled			
High Range Estimate of Recycling Rate	Natural		$35	$217
	White			
	Black/Colored			
	Not recycled			

APPENDIX 9:

ASSUMPTIONS RELATED TO NET SCRAP PLASTIC EXPORTS

Table A9.1 shows the breakdown of net export in the Philippines.

Table A9.1.
BREAKDOWN OF NET EXPORT IN THE PHILIPPINES

Net Export (Tonnes)	116,119
Estimated PET, PP, PE composition	60%
PET, PP, PE Amount	69,671
PET scrap (Tonnes)	3,000
PP scrap (Tonnes)	33,400
PE scrap (Tonnes)	33,400

Notes:
1. *Net Export is based on PSA data (Import = 16,645 tonnes , Export = 132,764 tonnes).*
2. *PET, PP and PE ratios based on combination of post-use disposal as per MFAs and stakeholder interviews.*

APPENDIX 10:

INFORMATION ON RECYCLERS IN THE PHILIPPINES

APPENDIX 10A: LIST OF CURRENT MECHANICAL RECYCLERS/PROCESSORS IN THE PHILIPPINES

Table A10.1.
LIST OF CURRENT MECHANICAL RECYCLERS/PROCESSORS IN THE PHILIPPINES

Status	Recycler	Resins			
		PET	PE	PP	Multilayer Flexibles
Operating and Known Capacities	Toplun Plastic Corporation	✔	✔		
	Yi Lu Jia Plastics	✔			
	Geoplast		✔	✔	
	Reinheart Marketing		✔	✔	
	New Foundland Plastic Manufacturing Company		✔	✔	
	Citipoly Industries		✔	✔	
	Infinity Eight Trading and Marketing	✔	✔	✔	
	TAT Recyclables and Renewable Corporation		✔	✔	
	Manly Plastics/Sentinel		✔	✔	
	Envirotech Waste Recycling Inc.		✔	✔	✔
	Green Antz Builders		✔	✔	✔
Operating, but Capacities Unknown	Polytrader Plastic Products	✔	✔	✔	
	Macondray Plastics Products Inc.		✔	✔	
	Bukidnon Plastic Manufacturing Corporation		✔	✔	
	Propack Manufacturing & Marketing Corporation	✔	✔	✔	
	Phoenix Asia Sunstar Corporation	✔	✔	✔	
	Polybase Enterprise Corporation		✔	✔	
Operating, but Resins and Capacities Unknown	Yunhap Plastic Corporation				
	Micycole				
Status Unknown	San Miguel Corporation (PE, PP)				
	Shifer Corporation (PET)				
Known Closures	Davao City Plastic Recycling Inc (PE, PP)				
	Plastic City (PET)				
	San Miguel Corporation (PET)				

APPENDIX 10B: COMPARISON BETWEEN INSTALLED RECYCLING CAPACITY AND ESTIMATED UTILISATION FOR THE DIFFERENT RESINS

PET

Table A10.2.
COMPARISON OF INSTALLED RECYCLING CAPACITY AND ESTIMATED UTILIZATION FOR PET

Recycler Name	Total Installed Capacity	Total Estimated Actual Utilization (80%)
Top Lun	60,864	53,600
Yi Lu Jia		
InfinityEight		
Others	6,086	
TOTAL (Rounded)	66,900	
Estimated informal PET pre-processors capacity (2019)	34,000	27,200
Estimated Net PET scrap export (2019)	3,000	3,000
TOTAL	103,900	83,800

Table A10.2. Notes:
1. *Estimated formal recycling capacity is based on known formal recycling capacity of 60,800 TPY (based on interviews with 3 major recyclers) plus an estimated/assumed amount to an additional 10% (based on knowledge of the existence of a minimum of 3 minor other recyclers which are known to or believed to recycle this resin, but where their capacity is not known as they were not contactable or responsive for this study and other industry sources have not been able to provide estimates for these other recyclers). This results in a total estimated formal PET recycling capacity of 66,900 TPY.*
2. *The estimated informal pre-processor capacity has been calculated as: PET Collected for recycling less PET formal recycler capacity less PET exported as scrap. The estimated informal capacity aims to account for the informal pre-processors that are known to turn PET into rPET flakes and then export to China. This practice has been widely reported by multiple stakeholders.*
3. *Based on interviews with the recyclers the average utilization rate is estimated to be 80% for 2019. This figure has been used in the calculation of the total estimated actual utilization for both formal and informal recyclers/pre-processors.*
4. *PET scrap export is an estimate and is based on the net of imports and exports. See Appendix 9 for the assumptions related to scrap plastic imports and exports per resin.*

PP

Table A10.3.
COMPARISON OF INSTALLED RECYCLING CAPACITY AND ESTIMATED UTILIZATION FOR PP

Recycler Name	Total Installed Capacity	Total Estimated Actual Utilization (80%)
Envirotech	36,899	35,500
Geoplast		
Newfoundland		
Reinheart		
Manly		
TAT Recyclables		
Toplun		
Citypoly		
InfinityEight		
Macondray		
Others	7,380	
TOTAL (Rounded)	44,300	
Estimated informal PP pre-processors capacity (2019)	55,000	44,000
Estimated Net PP scrap export (2019)	33,400	33,400
TOTAL	132,700	112,900

Table A10.3. Notes:

1. *Estimated formal PP recycling capacity is based on known formal recycling capacity of 36,900 TPY (based on interviews with 9 recyclers) plus an estimated/assumed amount to an additional 20% (based on knowledge of the existence of a minimum of 6 minor other recyclers which are known to or believed to recycle this resin, but where their capacity is not known as they were not contactable or responsive for this study and other industry sources have not been able to provide estimates for these other recyclers). This results in a total estimated formal PP recycling capacity of 44,300 TPY.*
2. *The informal pre-processor capacity has been calculated as: PP Collected for recycling - PP formal recycler capacity - PP exported as scrap.*
3. *Based on interviews with the recyclers the average utilization rate is estimated to be 80% for 2019. This figure has been used in the calculation of the total estimated actual utilization for both formal and informal recyclers/pre-processors.*
4. *PP scrap export is an estimate and is based on the net of imports and exports. See Appendix 9 for the assumptions related to scrap plastic imports and exports per resin.*

PE

Table A10.4.

COMPARISON OF INSTALLED RECYCLING CAPACITY AND ESTIMATED UTILIZATION FOR PE

Recycler Name	Total Installed Capacity	Total Estimated Actual Utilization (80%)
Envirotech	42,045	40,400
Geoplast		
Newfoundland		
Reinheart		
Manly		
TAT Recyclables		
Citipoly		
InfinityEight		
Macondray		
Others	8,409	
TOTAL (Rounded)	**50,500**	
Estimated informal PE pre-processors capacity (2019)	**29,700**	**23,700**
Estimated Net PE scrap export (2019)	**33,400**	**33,400**
TOTAL	**113,600**	**97,500**

Table A10.4. Notes:

1. *Estimated PE formal recycling capacity is based on known formal recycling capacity of 42,100 TPY (based on interviews with 10 recyclers) plus an estimated/assumed amount to an additional 20% (based on knowledge of the existence of a minimum of 6 minor other recyclers which are known to or believed to recycle this resin, but where their capacity is not known as they were not contactable or responsive for this study and other industry sources have not been able to provide estimates for these other recyclers). This results in a total estimated formal PP recycling capacity of 50,500 TPY.*
2. *The informal pre-processor capacity has been calculated as: PE Collected for recycling - PE formal recycler capacity - PE exported as scrap.*
3. *Based on interviews with the recyclers the average utilization rate is estimated to be 80% for 2019. This figure has been used in the calculation of the total estimated actual utilization for both formal and informal recyclers/pre-processors.*
4. *PE scrap export is an estimate and is based on the net of imports and exports. See Appendix 9 for the assumptions related to scrap plastic imports and exports per resin.*

APPENDIX 11:

PET POLYESTER MFA

The PET Polyester MFA which is not included in the study is shown in Figure A11.1.

Figure A11.1.
PHILIPPINES PET POLYESTER MFA (2019)

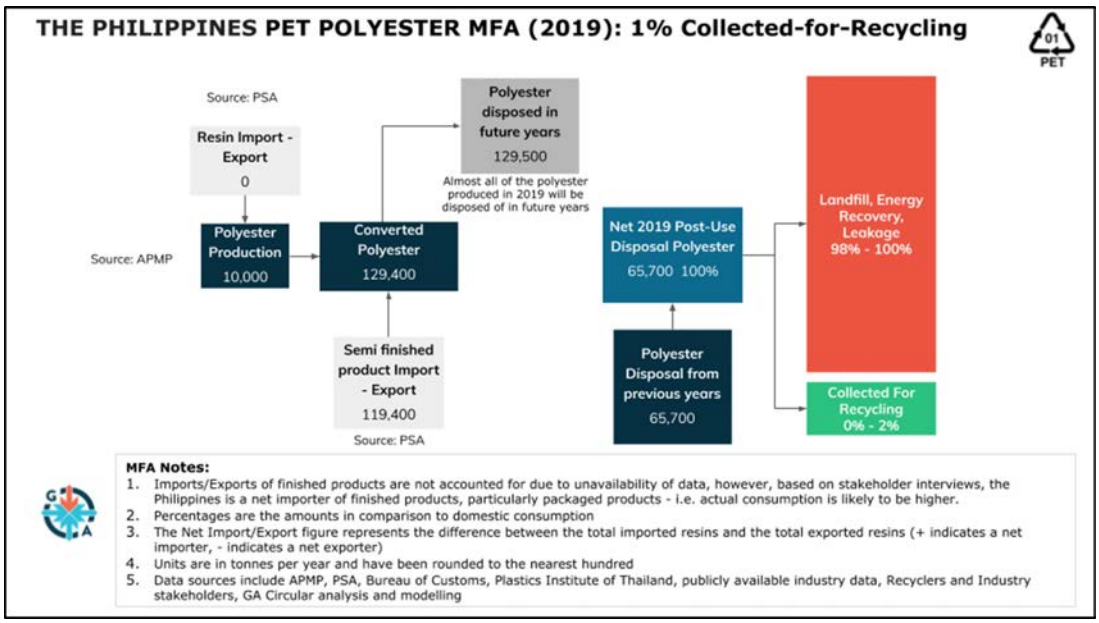


Figure Notes:

1. *Data sources for resin production, imports and exports, material accumulation in future years and disposal from previous years, consumption, and collection-for-recycling and its breakdown include: Association of Petrochemical Manufacturer of the Philippines (APMP), Philippines Statistic Authority (PSA), UN Comtrade, Plastics Institute of Thailand, publicly available industry data, recyclers and industry stakeholders including brand owners, industry associations and NGOs, GA Circular analysis and modeling*
2. *Due to the limited scope of the project and data availability, some aspects of the flow were not able to be examined. For example, for imports and exports of finished products, plastics that were not recycled, the proportions which ended up between Landfill, Leakage, and Energy Recovery were not determined.*
3. *In reality, most of these values have wide fluctuations. The values shown in this chart are our best average estimates of the realities.*

APPENDIX 12:

OVERVIEW OF MAIN RDF PRODUCERS, END USERS AND THEIR CAPACITY

Table A12.1.
OVERVIEW OF MAIN RDF PRODUCERS, END USERS AND THEIR CAPACITY

Producers of RDF	Estimated RDF [CAPACITY]	Estimated RDF production [ACTUAL]	Estimated Plastic content [ACTUAL]
Green Alternative Technology Specialist Inc (GATSI)	300K - 450K TPY	80K - 120K TPY	20K - 60K (Multilayer flexibles estimate = 5K-30K)
GreenCycle			
FDR - Integrated Resource Recovery Management Inc.			
Pasig City RDF Plant			
Montalban City RDF Plant			
Geocycle (part of Holcim Philippines)			
Cement Kilns Co-processing RDF	**Estimated Cement production [CAPACITY]**	**Estimated RDF Utilisation [CAPACITY]**	
Cemex	25M - 35M TPY	1.2M - 1.6M TPY	
Holcim Philippines			
Republic Cement			
Northern Cement (San Miguel Group)			
Pacific Cement			
Taiheiyo Cement			

Table A12.1 Notes:

1. *This list may not include all the companies processing multilayer flexibles.*
2. *Estimated RDF production does not include biomass from agriculture. Of RDF production, plastic is assumed to be between 25%-50%, of which MLPs are assumed to be between 25-50%.*
3. *Co-processing capacity is estimated to be 5% of the total clinker capacity.*
4. *SMC announced on 25th October 2020 that it is targeting to reduce use of traditional fuel by up to 50% and substitute this with plastic waste (up to 1.5 million tons of plastic waste per year).*[7]
5. *Conversion to alternative energy sources is heavily dependent on the cement kiln setup. Some cement kilns in Europe are operating at 80-100% of alternative fuels. Alternative fuels can be used for up to 30% without capital investments to change the setup of the cement kiln. Beyond 30% requires CAPEX investments.*

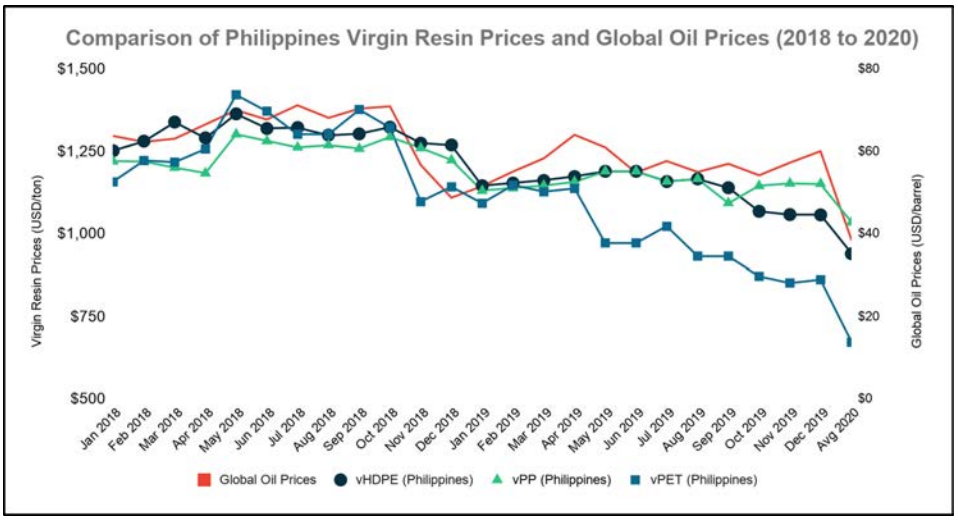
7 The Philippine Star - Plastic waste to fuel SMC cement plants (2020)

APPENDIX 13:

COMPARISON OF PHILIPPINE RESIN PRICES AND GLOBAL OIL PRICES

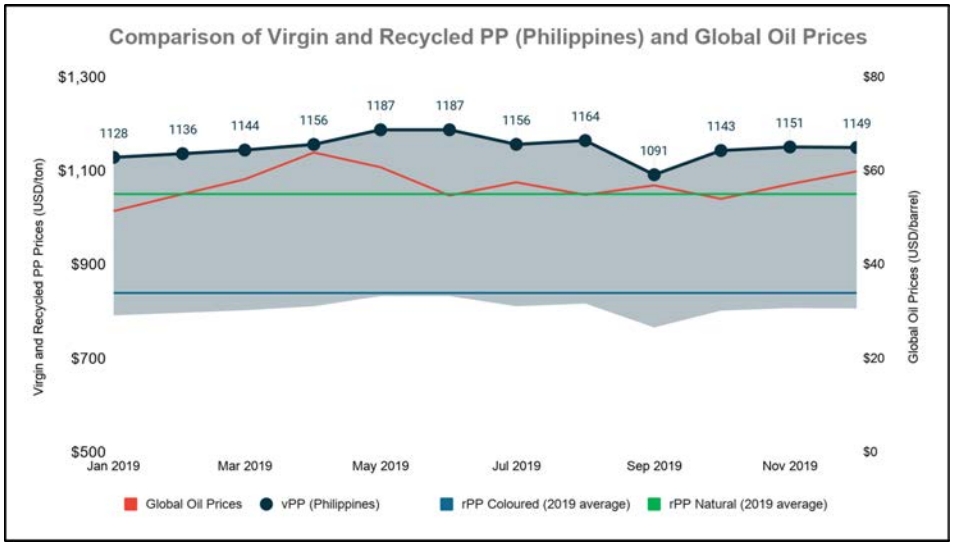
Comparison of Virgin Resin Prices and Global Oil Prices

Figure A13.1.
EU PRICE COMPARISON OF VIRGIN RESINS. SOURCE: VARIOUS CONVERTORS IN THE PHILIPPINES FOR VIRGIN RESIN PRICES



Comparison of Virgin PP, recycled PP and Global Oil Prices

Figure A13.2.
COMPARISON OF VIRGIN PP AND RECYCLED PP PRICES IN THE PHILIPPINES AND GLOBAL OIL PRICES. SOURCE: FEDERAL RESERVE ECONOMIC DATA AND RECYCLERS FOR RECYCLED RESIN PRICES



Note: Monthly recycled prices are not available and thus 2019 average recycled sales prices obtained from recyclers in the Philippines have been used for comparison.

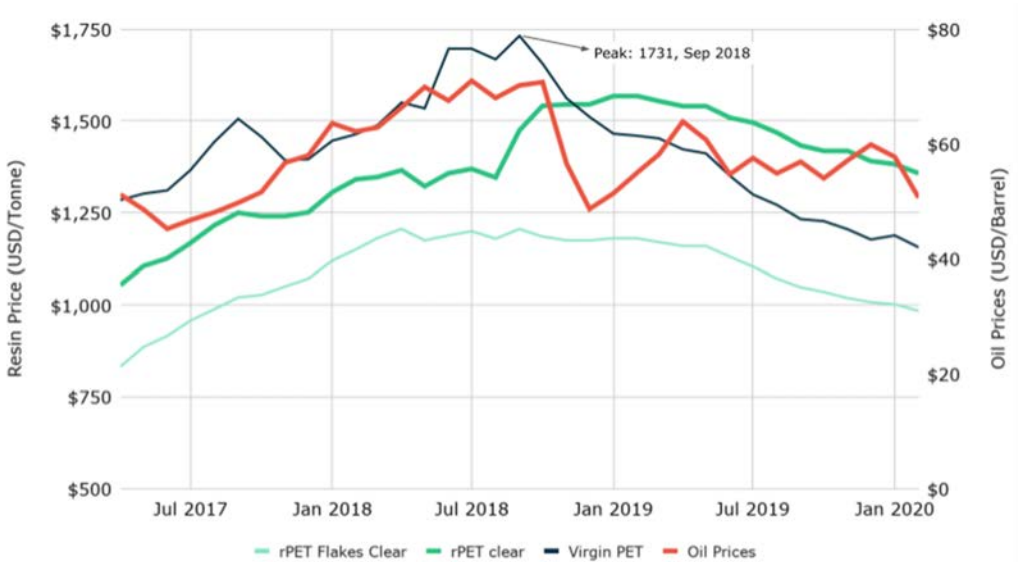
APPENDIX 14:

COMPARISON OF VIRGIN AND RECYCLED RESINS PRICES AND OIL PRICES

Figures A14.1 to A14.4 show the EU price comparison of virgin and recycled resins. Please note that EU prices for virgin plastics and recycled plastics have been used as a proxy for global prices because the EU has the greatest price transparency/data availability for virgin prices and recycled prices.

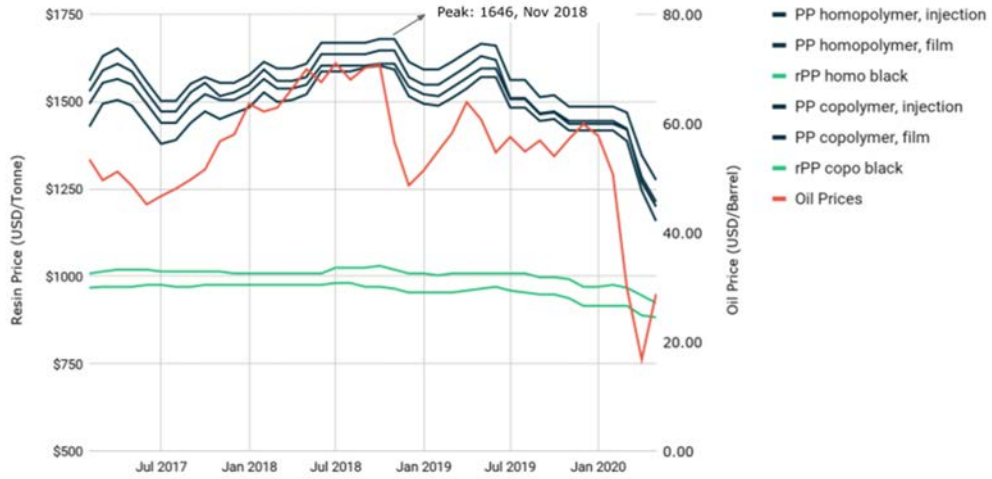
PET

FigureA14.1.
EU PRICE COMPARISON OF VIRGIN PET AND RECYCLED PET. SOURCE: INDUSTRY DATA



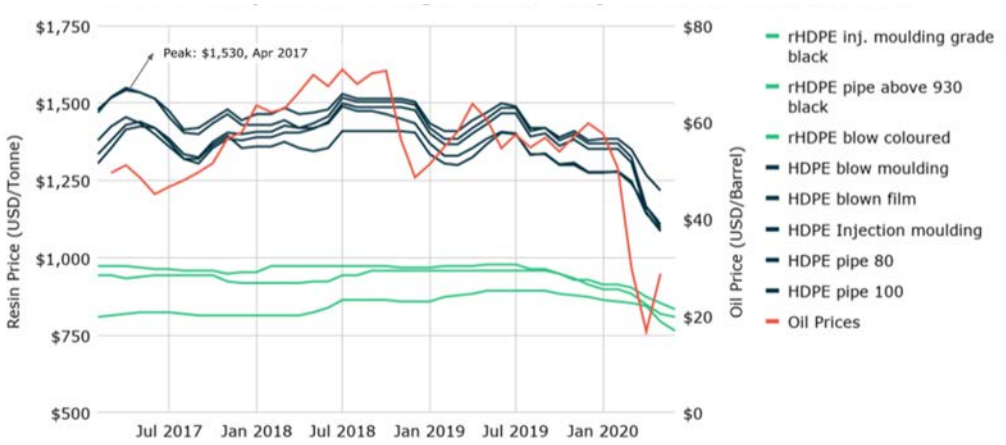
PP

Figure A14.2.
EU PRICE COMPARISON OF VIRGIN PP AND RECYCLED PP. SOURCE: INDUSTRY DATA



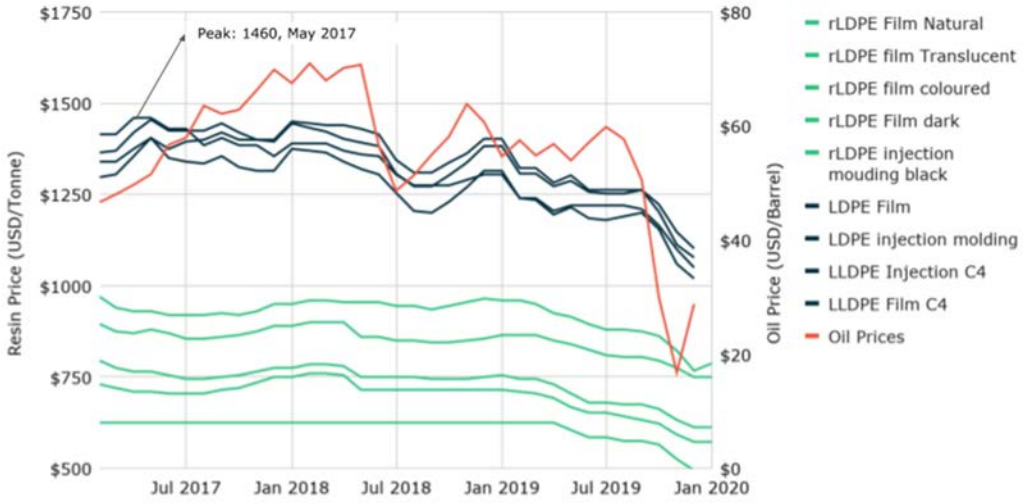
HDPE

Figure A14.3.
EU PRICE COMPARISON OF VIRGIN HDPE AND RECYCLED HDPE. SOURCE: INDUSTRY DATA



LDPE

Figure A14.4.
EU PRICE COMPARISON OF VIRGIN LDPE AND RECYCLED LDPE. SOURCE: INDUSTRY DATA



APPENDIX 15:

COMPARISON OF VIRGIN AND RECYCLED RESIN PRICES ACROSS FIVE ASIAN MARKETS

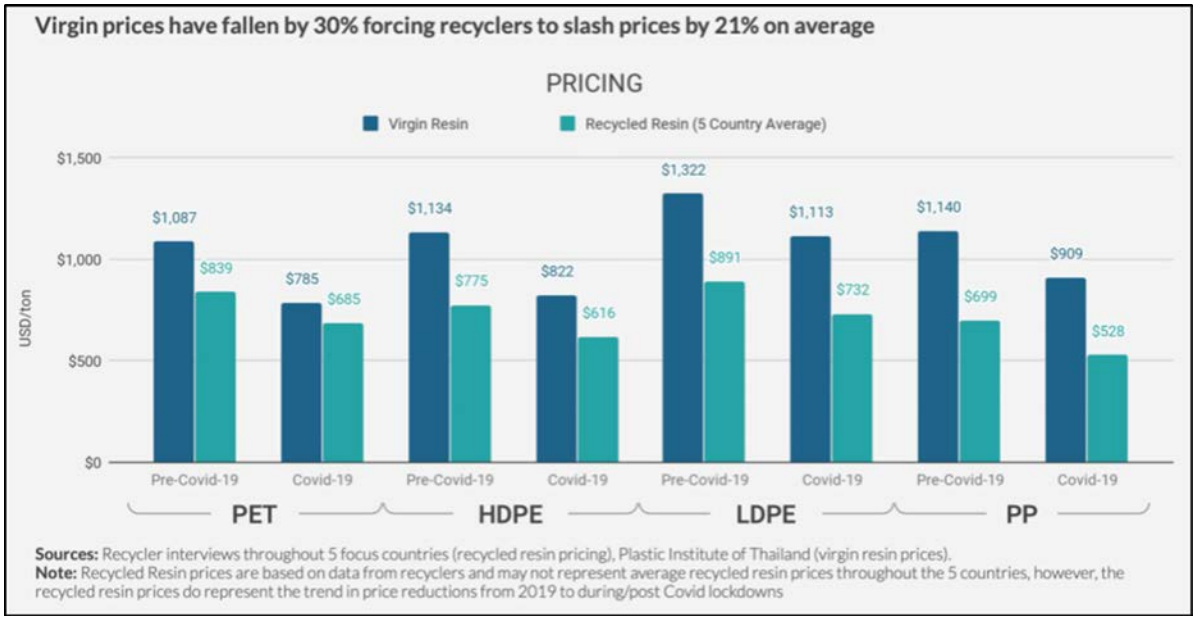
Figure A15.1 shows the virgin prices and recycled prices from 2019 to 2020, for the Philippines and four other Asian markets. As can be seen:

- For 2019, the average pricing differential between virgin and recycled resins was at least USD 230/ton for most plastics.
- The virgin prices fell by 30% from 2019 to 2020, which forced recyclers to slash their prices by 21% on average across the four key resins in order to keep competitive against virgin plastics.
- With this, the pricing differential has narrowed across all the resins. PET has faced the largest reduction in price gap with only a USD 100/ton price differential remaining between virgin and recycled PET since about April/May 2020. This translates to roughly a 13% price difference between the virgin and recycled PET, thus well below the 15%-30% price differential recyclers need in order for recycled resins to remain competitive. A number of recyclers interviewed are selling at loss-making prices and yet are unable to compete with virgin resins.

While recycled prices have started to slowly recover after the Covid-19 pandemic, the recovery is limited as oil prices and virgin prices continue to be low.

Figure A15.1

VIRGIN PRICES VS. RECYCLED PLASTIC PRICES ACROSS THE PHILIPPINES, THAILAND, VIETNAM, INDONESIA AND INDIA FROM 2019 TO 2020.[8]



8 GA Circular & Circulate Capital - Safeguarding the Plastic Recycling Value Chain: Insights from COVID-19 impact in South and Southeast Asia (2020)

APPENDIX 16:

MANDATING RECYCLED CONTENT TARGETS & THE PHILIPPINES' ABILITY TO FULFILL THESE TARGETS

16.1 BRAND COMMITMENTS BY GLOBAL & LOCAL BRANDS OPERATING IN THE PHILIPPINES

Table A16.1.
EXAMPLES OF FMCG BRANDS' PACKAGING COMMITMENTS TOWARDS REDUCING VIRGIN PLASTIC USAGE AND INCREASING RECYCLED CONTENT WITHIN A 5 TO 10 YEARS HORIZON.

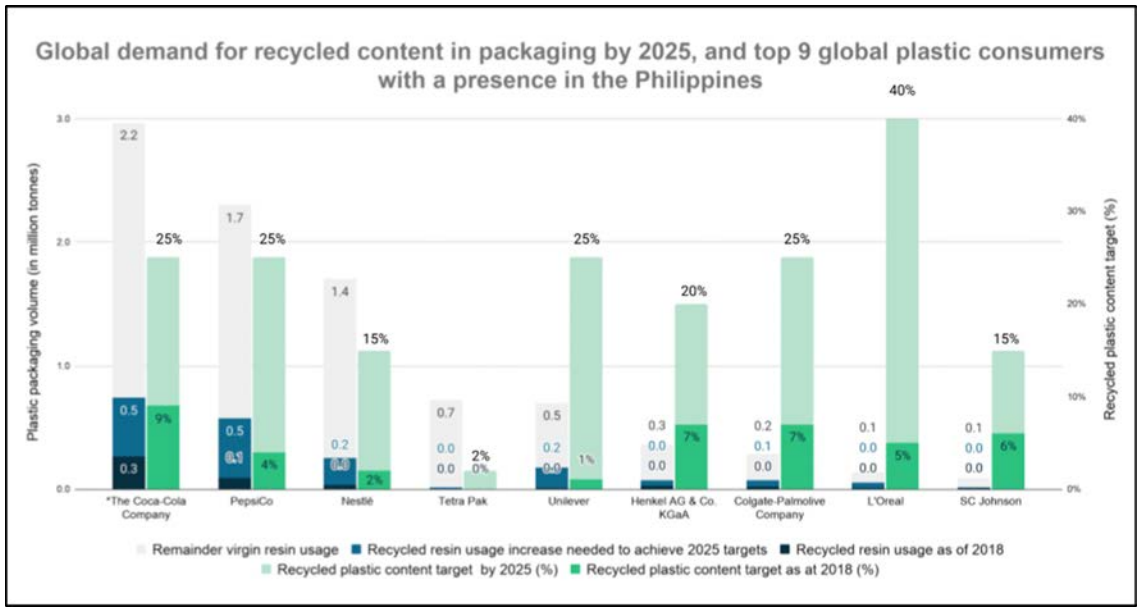
#	Producer	Plastic Packaging Target
1	Coca-Cola Philippines	By 2030: "Every bottle back", meaning Coca-Cola targets to ensure recycling of amounts totaling to 100% of their market input.[9]
2	PepsiCo Philippines	By 2025: 100% reusable, recyclable or compostable and at least 25% recycled plastic content. Reduce 35% of virgin plastic content across our beverage portfolio.[10]
3	Nestlé Philippines	100% reusable or recyclable by 2025.[11]
4	Unilever Philippines	By 2025: 100% reusable, recyclable or compostable, 25% recycled content, 50% reduction of virgin plastics usage by 2025.[12]
5	Henkel	By 2025: 100% reusable or recyclable and 50% reduction of virgin plastic usage.[13]
6	Colgate Palmolive	By 2025: 100% recyclable, refillable or compostable and reduce virgin plastic usage by one third.[14]
7	L'Oréal	By 2025, 100% refillable, rechargeable, recyclable or compostable and 50% recycled or bio-based content.[15]
8	SC Johnson	By 2025, 100% reusable, recyclable or compostable and triple use of PCR.
9	Procter & Gamble Philippines	Ambition: 100% recyclable or reusable packaging by 2030.[16]
10	San Miguel Packaging Specialists	30% recycled content in new PET bottles.[17]

Figure A16.1 shows the 2025 recycled plastic content targets for the top nine companies that have presence in the Philippines and are participating in the New Plastics Economy Global Commitment led by the Ellen MacArthur Foundation. The total plastic packaging volume used by the nine companies amounted to about 9.3 million tonnes in 2018, out of which only about 0.46 million tonnes was recycled content, based on their recycled plastic content usage as of 2018. In order to meet the total 2025 recycled plastic content targets for these 9 companies, the global recycled resin usage by these companies collectively would have to increase by another 1.52 million tonnes, 230% higher than the volume of recycled resin usage as of 2018. Note that

9 One News - Coca-Cola Partners With LGUs, Other Groups To Collect 'Every Bottle Back' By 2030 (2019)
10 PepsiCo - 2019 Sustainability Report Goals & Progress (2019)
11 WWF - Working towards a waste-free future (2020)
12 Unilever - Waste & Packaging (2020)
13 Henkel - Henkel adds new packaging materials to its "Design for Recycling" tool (2020)
14 Colgate - 2025 Sustainability Strategy (2020)
15 L'Oréal - Plastic Packaging Policy
16 P&G - Environmental Sustainability (2018)
17 WWF - EPR scheme assessment for plastic packaging waste in the Philippines (2020)

these figures assume no growth in overall plastic usage—and that they are for just the top nine global plastic consuming companies that have a presence in the Philippines.

Figure A16.1.
2025 RECYCLED PLASTIC CONTENT TARGETS FOR TOP NINE GLOBAL PLASTIC CONSUMERS WITH A PRESENCE IN THE PHILIPPINES (AMONG THE TOP 10 COMPANIES PARTICIPATING IN NEW PLASTICS ECONOMY GLOBAL COMMITMENT)



Data Source: Ellen MacArthur Foundation New Plastics Economy Global Commitment 2019 Progress Report.[18]

Figure A16.1. Notes:
1. **The Coca-Cola Company does not have a 2025 target for recycled content usage, but instead has a 2030 target which is 50%. For the purposes of the analysis, a recycled plastic content target for 2025 of 25% is assumed.*
2. *These figures assume no growth in overall plastic usage - and that they are for the just the top 9 global plastic consuming companies that have a presence in the Philippines.*

16.2 RECYCLED CONTENT VOLUMES TO MEET RECYCLED CONTENT TARGETS

With regards to the ability for stakeholders in the Philippines, there is insufficient recycling capacity to enable implementation of recycled content targets of 15%, as can be seen in Table AXVI.2.

Table A16.2.
RECYCLED CONTENT VOLUMES AND MISSING RECYCLING CAPACITY (TONNES PER YEAR). 2030 ESTIMATED CONSUMPTION IS BASED ON 2.5% COMPOUND ANNUAL GROWTH RATE (CAGR).

Resins recycled in the Philippines	2030 Estimated Plastic Consumption (TPY)	Recycled Content Volumes (TPY) Based on various 2030 Recycled Content Targets		Estimated Local Recycling Capacity (2019, TPY)	Missing Capacity for 2030 (TPY)
		15%	30%		
PET	226,821	34,023	68,046	66,900	121,061
PP	493,169	73,975	147,951	44,300	454,529
PE	977,528	146,629	293,258	50,500	932,808
Total	**1,697,518**	**254,628**	**509,256**	**161,700**	**1,535,818**

18 Ellen MacArthur Foundation - New Plastics Economy Global Commitment 2019 Progress Report (2019)

16.3 CHALLENGES TO SUBSTITUTING VIRGIN PLASTIC WITH RECYCLED PLASTIC CONTENT

1. Usage of recycled plastics require sizable investments in upgrading/changing production and packaging lines, expensive re-testing to ensure compliance with safety regulations and quality/durability requirements.
2. For the initial few years until demand picks up (to at least ≥10%), recycled plastics are likely to come from several different suppliers, which are smaller in size than typical suppliers of virgin plastics. Hence, they are less able to meet fluctuations in demand volume as they cannot control the rate of source materials arising without holding expensive feedstock or finished material buffer volumes.
3. Consumer acceptance of recycled plastics also needs to be addressed. Cosmetic blemishes from recycled content may not affect technical performance of a product, but can still influence aesthetic factors. So, it is difficult to expect the wide use of recycled plastics for the products whose design and look can play a critical role in consumer purchase decisions.
4. In the case of substituting virgin plastics with recycled content in food-contact applications, an approval to use rPET in food grade applications is currently underway in Philippines' Food and Drug Administration (FDA), which creates a precedent for the substitution of virgin plastics with recycled content. However, FDA issues permits on a per product basis as opposed to resin basis, which limits the extent that the substitution of virgin plastics can occur. Additionally, to our knowledge, there have been no processes that have been initiated regarding the use of other recycled resins (i.e. PE, PP) in food-contact applications.

Under the guidelines of BOI's 2017 Investments Priority Plan, pipeline projects for oil and gas are considered as one of the preferred activities for investments.[19] Investments in pipeline projects for oil could increase the production of virgin resins, keeping the prices low. As demand for recycled resins is dependent on the price of virgin resins, there is no incentive for companies to use recycled content and this could lead to a shift away from the use of recycled resins.

19 BOI - Investment guidelines (2017)

APPENDIX 17:

THE ENABLING POLICY ENVIRONMENT FOR CIRCULARITY AND INTERVENTIONS FOR PLASTIC PACKAGING

Creating an enabling policy environment for circularity of plastic packaging through a range of policy instruments plays a defining role in the success towards achieving circularity. In this section, the study will analyze the existing national-level regulations, roadmaps and timelines and identify any gaps that are limiting the scale-up of the domestic plastic recycling industry and compare these against a benchmark of best practices from other jurisdictions.

17.1 LIFE CYCLE APPROACH TO PLASTICS CIRCULARITY POLICIES

Assessment of the enabling policy environment for plastics circularity in the Philippines can be approached using a life cycle approach for each of the major end-use industries consuming plastics. Over their lifetime, plastic products can contribute to various environmental impacts. Taking a life cycle approach considers the range of impacts throughout the life of a product and quantifies this by assessing the emissions, resources consumed and pressures on health and the environment that can be attributed to a product. It takes the entire life cycle into account—from the extraction of natural resources through to material processing, manufacturing, distribution and use; and finally, the re-use, recycling, energy recovery and the disposal of remaining waste (Figure A17.1).[20] Thus a life cycle approach provides a holistic framework for assessment of policies and their impacts.

Figure A17.1.
HOW A LIFECYCLE APPROACH CAN ADDRESS FREQUENT ISSUES IN PLASTIC WASTE MANAGEMENT

For example, taking a life cycle approach can quantitatively address a frequent issue in plastic waste management: whether to recycle or incinerate used plastic products such as plastic bottles. The production of plastic bottles from raw materials requires about 80 MJ/kg (energy per kilogram). Incineration can generate about 3 MJ/kg of electricity and about 10 MJ of process steam from the recovered energy. However, despite this small energy gain, new bottles would have to be produced, requiring high amounts of energy. In contrast, recycling and selective collection consumes 9 MJ/kg while also avoiding the much higher energy consumption used in the production of new plastic from raw materials. Recycling therefore normally results in lower energy consumption than incinerating bottles and producing new ones from raw material.

This example assumes, however, that the plastic is not heavily soiled and is not degraded in the recycling process. If the plastic recycling process produces plastic products of lower value end use applications or under different conditions then it could result in different conclusions.

For the plastic packaging industry, policies impacting plastics circularity can be divided into the following life cycle stages:

1. General Legislative Framework: The overarching legislation which guides policies for the industry.
2. Production: Policies which affect the ways and rules under which plastic products are manufactured.
3. Consumption: Policies which affect consumption behavior.

20 European Commission - Life Cycle Thinking and Assessment for Waste Management

4. Disposal: Policies which relate to what occurs when a product is sent to a landfill, incinerator, or is leaked into the environment.
5. Recycling: Policies which affect the recovery of plastics after consumption and the actual recycling process.

17.2 PACKAGING: ENABLING POLICY ENVIRONMENT IN THE PHILIPPINES

Packaging: Typical Policies Across Life Cycle in Benchmark Jurisdictions

Table A17.1.
PACKAGING: TYPICAL POLICIES ACROSS LIFE CYCLE IN BENCHMARK JURISDICTIONS

Life Cycle Stages	General Policy Framework	Production	Consumption	Disposal	Recycling
Policies	MSW Legislation National Targets Export Import Trade Policy	Design Standards Recycled Content Policy Alternative Materials Packaging Taxes	Source Reduction Policies (e.g. plastic bag bans) Green procurement	Landfill bans Diversion from landfill targets Anti-Litter legislation	Source segregation/ deposit refund schemes Food-grade standards Extended Producer Responsibility

Between the packaging and non-packaging industries analyzed in this report, packaging has by far the most developed policies due to its heavy use of plastics and the attention that the leakage of plastics has garnered over the last 5 years. Hence, as described in Table A17.1, the best policies that deal with plastic packaging are those which engage stakeholders across the value chain, plug leakages along the product life cycle and have clear targets which enables each stakeholder to understand what is required of them and hence enables effective implementation.

Packaging: Current Policies Across Life Cycle in the Philippines and Benchmark Jurisdictions

Table A17.2.
CURRENT POLICIES ACROSS PACKAGING LIFE CYCLE

Light blue = Best case practice

Life Cycle Stages	The Philippines	Benchmarks from other jurisdictions		
		Thailand	India	European Union
General Legislative Framework	Republic Act 9003, also known as the Ecological Solid Waste Management Act of 2000, provides a comprehensive outline of solid waste management plans. It creates necessary incentives, prohibits certain acts, and puts in place targets and deadlines. The National Solid Waste Management Strategy 2012-2016 highlights challenges and opportunities of solid waste management and discusses solid waste management practices gathered through consultations with stakeholders. Section 48 of RA9003 prohibits the import of toxic wastes that are misrepresented as being recyclable or containing recyclable content.	Plastic Waste Management Roadmap 2030 outlines plans to eliminate 7 types of plastic by 2022 and recycle 100% of plastic waste by 2027. All plastic waste imports will be banned by 2021.	Plastic Waste Management (PWM Rules), 2016. Collection targets exist and minimum requirements for EPR schemes do not exist in these rules.	The Packaging and Packaging Waste Directive sets targets for the recovery of packaging waste and covers strategies to be implemented by member states to collect packaging waste.

Production	Under Section 57 of RA9003, the NSWMC encourages commercial and industrial establishments to manufacture environmentally- friendly products through creating incentives. These establishments should develop and adopt innovative processes, such as conserving raw materials and reducing waste, that promote effective SWM practices.	Ban on plastic cap seals* FDA ban on recycled content in food packaging. This ban is however being reconsidered and is expected to be amended by end of 2020. ** The plastics cap seal ban is in reality a voluntary agreement with manufacturers not to use the plastic cap seals.*	Plastics producers need to work out modalities for waste collection systems for collecting back the plastic waste within a period of six months. No targets set. Maharashtra state requires industrial packaging produced to include at least 20% recycled material.	The "essential requirements of packaging" requires the minimization of packaging volume and weight, design of packaging for reuse or recovery and the encouragement of recycled materials usage in packaging. The EU Commission is also initiating work on new harmonized rules to ensure that by 2030 all plastics packaging placed on the EU market can be reused or recycled in a cost-effective manner.
Consumption	Section 48 of RA9003 also prohibits the import of consumer products that are packaged in non-environmentally acceptable materials. Resolution No. 1363 of the National Solid Waste Management Commission bans the use of "unnecessary"** single-use plastic products in Government offices. ***7 unnecessary single use plastics:* *1) Plastic cups (lower 0.2mm in thickness)* *2) Plastic drinking straws* *3) Plastic coffee stirrers* *4) Plastic spoons* *5) Plastic forks* *6) Plastic knives* *7) Plastic labo and thin-filmed bags (lower than 15 micron)*	Bans use of single-use plastic bag** The 2nd Green Public Procurement Plan encourages green consumption within the government.	Waste generators including institutional generators, are required to segregate plastic waste.	The Single Use Plastics directive bans selected single-use products made of plastic for which alternatives exist by 2021 and implements EPR systems for others.
Disposal	In the Philippine Development Plan 2017-2022, the target for the solid waste diversion rate increased to 80% by 2022.	There are no targets for diversion from landfill or landfill bans currently in Thailand.	Local bodies are responsible for segregation, collection, storage and disposal. No targets set. Local bodies are required to encourage use of plastic waste for road construction or energy recovery or waste to oil or co-processing in cement kilns under Plastic Waste Management Rules 2016.	The EU Landfill Directive aims to phase out landfilling for recyclable material by 2025.

Recycling	Under Section 21 of RA9003, segregation of waste at the source is mandated. Under Section 31 of the RA9003, the NSWMC, together with NEC, DTI, and DOF should establish guidelines to develop the local recycled goods market. Section 32 of RA9003 states that every barangay, or cluster of barangays, should have a Materials Recovery Facility (MRF) established.	There are no EPR, take-back, or source segregation regulations currently in Thailand.	The draft 2019 National Resource Efficiency Policy sets targets for packaging recycling including 100% recycling rate for PET by 2025 and 75% recycling and reuse rate for other plastics by 2030.	The Single-Use Plastics Directive establishes EPR systems, by 2025, which covers the costs of collection, transport, treatment, cleanup of litter and awareness-raising measures for all packaging. The directive mandates: (a) New recycling target for plastic packaging, set at 55% in 2030; (b) Specifically for plastic PET bottles a 25% recycled content target by 2025 and 30% recycled content target by 2030; (c) Collection target of 77% of single-use plastic drink bottles by 2025 and 90% by 2029 through EPR or through deposit refund schemes.

There are three key lessons to be gained from the assessment on circularity for the packaging industry:

1. The EU has the best policies for packaging circularity which reflects the EU's expertise and experience in the Circular Economy. For example, the "essential requirements of packaging" by the EU establishes rules on packaging design to minimize its impact on the environment and to improve recyclability of packaging. By 2025, at least 55% of all plastics packaging in the EU are required to be recycled. As of 2017, this rate is at 42%. The clear requirements and targets mean that there is less confusion and better enforcement. This also reflects the strong governance that the EU and its member states have that enables them to enforce these rules across all the stakeholders in the EU. Therefore, should the Philippine government want to set its ambitions high, it should look to the targets of the EU as a reference point.
2. Japan has a better general legislative framework than the EU as the Basic Act for Establishing a Sound Material-Cycle Society is an enforceable law with details on how stakeholders should act to increase collection of recyclables. On the other hand, while the Packaging and Packaging Waste Directive of the EU is mandatory (i.e. the targets and actions listed within it must be complied by member states), the directive must be interpreted by member states and then laws in each member state must be enacted to comply with the directive. It is not, by itself, a legislation hence is not applicable to the Philippines context. Hence, Japan's Basic Act for Establishing a Sound Material-Cycle Society can be used as a solid reference point to draft an overarching Circular Economy legislation for the Philippines.
3. While the Philippines has some policies that encourage circularity (e.g. source segregation), there is a general lack of enforcement of the policies as it is up to the initiatives of the local governments to implement them who are poorly funded. Policies to allow recycled resins in food applications with the exception for PET are under a review process that is expected to be lengthy. Hence, a potential large domestic market for recycled plastics in food-contact applications remains untapped. This eliminates the local demand for high value products such as food grade recycled materials while also making the prices of other recycled materials vulnerable to global fluctuations.

APPENDIX 18:

CONSUMPTION OF FLEXIBLE PACKAGING AND PLASTIC TYPES

Figure A18.1.
CONSUMPTION OF PACKAGING TYPES IN THE HIGH VERSUS LOW-INCOME DEMOGRAPHICS.[21]

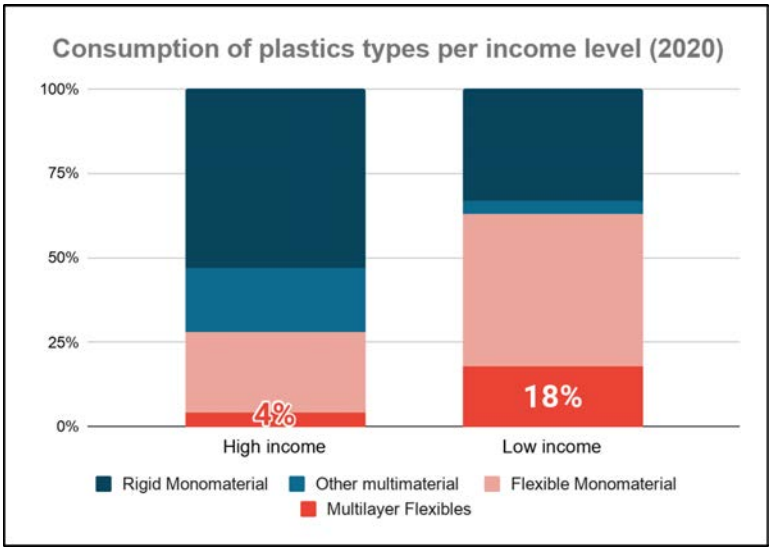
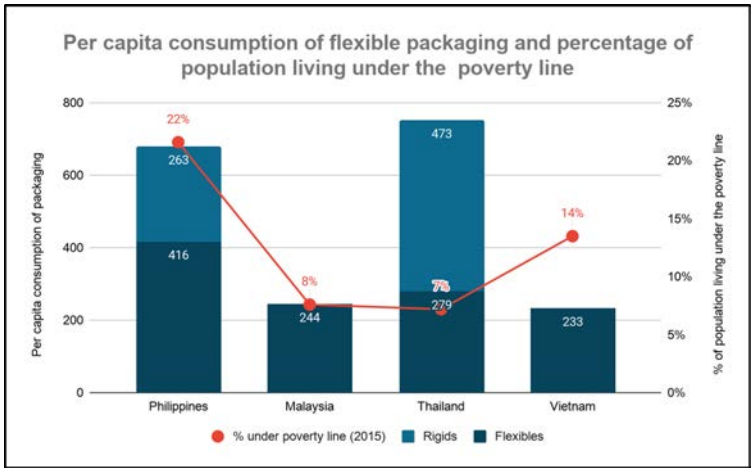


Figure A18.2.
THE PER CAPITA CONSUMPTION OF FLEXIBLE PACKAGING UNITS AND, WHERE AVAILABLE, RIGID PACKAGING UNITS IS SHOWN IN BARS WHILE THE PERCENTAGE OF POPULATION LIVING UNDER THE POVERTY LINE IS DEMONSTRATED IN THE RED GRAPH.[22]



21 PEW - Breaking the Plastic Wave (2020)

22 Packaging Industry Market Input data 2016-2017

APPENDIX 19:

MISSING CAPACITY VS. INSTALLED CAPACITY FOR RECYCLING OF MAJOR RESINS

APPENDIX 19A: CALCULATION FOR MISSING CAPACITY VS INSTALLED CAPACITY FOR RECYCLING OF MAJOR RESINS IN THE PHILIPPINES

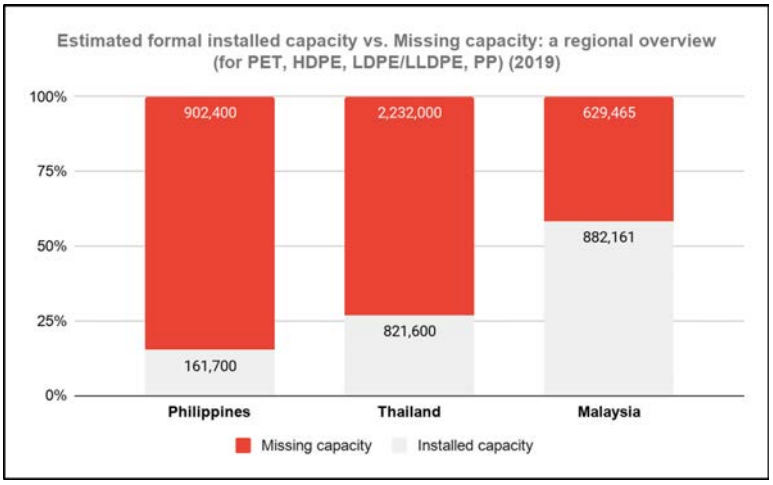
Table A19.1 shows the figures used to derive the estimated installed capacity and missing capacity for each of the key resins. The recycling capacity figures are based on questionnaire responses/interviews for this study or other studies by GA Circular, or based on publicly available information or past conversations, which could not have been validated as some of these recyclers have not been available for questionnaire responses/interviews for this study. The missing capacity for each resin is calculated by subtracting the estimated formal recycling installed capacity from the consumption.

Table A19.1.
CALCULATIONS USED TO DERIVE THE ESTIMATED INSTALLED CAPACITY VS. MISSING CAPACITY FOR RECYCLING OF MAJOR RESINS IN THE PHILIPPINES

Resin	Consumption (TPY)	Estimated Formal Recycling Installed Capacity (TPY)	Missing Capacity (TPY)
PET	172,900	66,900	106,000
PP	375,900	44,300	331,600
PE	515,300	50,500	464,800
Total	1,064,100	161,700	902,400

APPENDIX 19B: COMPARISON OF MISSING CAPACITY VS. INSTALLED CAPACITY FOR RECYCLING OF MAJOR RESINS IN 3 MARKETS

Figure A19.1.
ESTIMATED FORMAL INSTALLED CAPACITY VS. MISSING CAPACITY FOR RECYCLING OF MAJOR RESINS IN THE PHILIPPINES



APPENDIX 20:

DATA ON BARANGAYS AND LGUS IN THE PHILIPPINES

Table A20.1.
DATA ON BARANGAYS AND LGUS

Indicator	Available data (year)	Gap (%)
Number of barangays in the Philippines	42,046 (2020)	-
Number of Barangay SWM Committees formed	18,249 (2010)	23,797 (57%)
Number of active Barangay SWM Committees	5,549 (2010)	36,497 (87%)
Number of Barangays served with MRF	14,450 (2020)	27,586 (66%)

Source: Senate of the Philippines,23 National Solid Waste Management Status 2008-201824 and interview with NSWMC 2020

A majority of LGUs have yet to comply with the provisions of RA 9003, particularly on the establishment of local SWM Boards, submission of SWM Plans, establishment of MRFs, and closure or upgrading of all open and controlled dumpsites. As of 2020, only 37% of LGUs have fully complied with all the aspects of RA 9003[25]:

- As of November 2020, 1,005 SWM plans had been submitted and approved by the NSWMC Secretariat.[26]
- RA 9003 mandates that every barangay or cluster of barangays must set up an MRF where biodegradable waste is converted into compost, recyclable material is collected and sold to junk shops/recyclers, and residual waste is collected for transport to sanitary landfills. As of November 2020, only 14,450 (34.4%) of the barangays were served by an MRF.[27]
- As of 2020, there are only 186 operational sanitary landfills servicing about 407 LGUs, representing 25% of the total number of LGUs that require sanitary landfills.[28] At least 261 illegal dumpsites still operate across the country.[29]

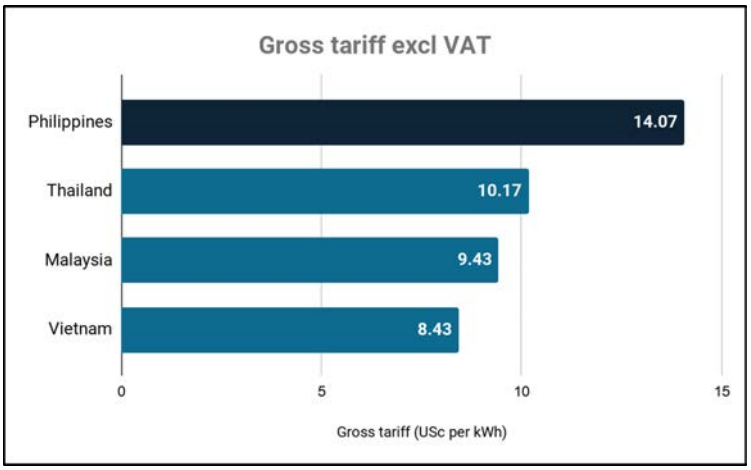
23 Senate of the Philippines - Philippine Solid Wastes At A Glance (2017)
24 DENR-EMB - National Solid Waste Management Status Report (2008-2018) (2018)
25 NEDA - Philippine Development Plan 2017-2022 (2017)
26 Interview with Crispian Lao representing NSWMC, 2020.11.18
27 Interview with Crispian Lao representing NSWMC, 2020.11.18
28 The Manila Times - Only 25% of LGUs have landfills (2020)
29 NSWMC Database - National Solid Waste Management Disposal Facilities Nationwide (2020)

APPENDIX 21:

COMPARISON OF ELECTRICITY COSTS ACROSS FOUR MARKETS

Figure A21.1.

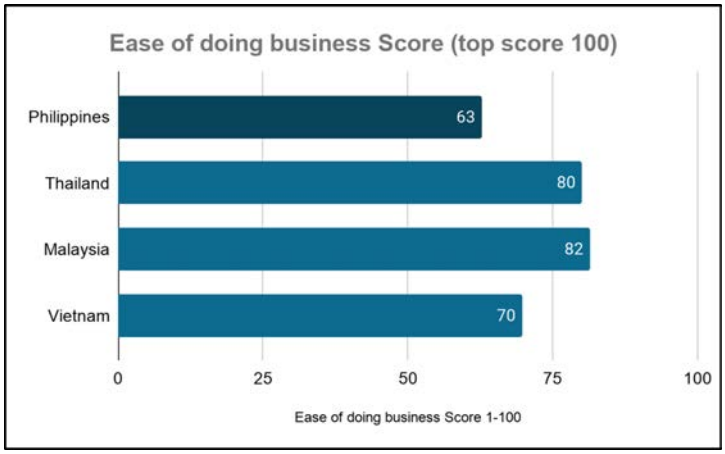
INTERNATIONAL ENERGY CONSULTANTS 2018 GLOBAL RETAIL ELECTRICITY TARIFF SURVEY REVEALS THE HIGH PRICE LEVEL OF ELECTRICITY IN THE PHILIPPINES AS COMPARED TO THAILAND, MALAYSIA AND VIETNAM



APPENDIX 22:

EASE OF DOING BUSINESS SCORE

Figure A22.1.
THE PHILIPPINES SCORES LOWER AS COMPARED TO REGIONAL PEERS DESPITE SIGNIFICANT IMPROVEMENTS IN RECENT YEARS. SOURCE: WORLD BANK OPEN DATA



APPENDIX 23:

TIGHTENING OF GLOBAL REGULATIONS ON SCRAP PLASTIC & RECYCLED PLASTIC TRADING

23.1 BASEL CONVENTION PLASTIC WASTE AMENDMENTS

Basel convention, a near-universal treaty which regulates the transboundary movements of hazardous wastes and other wastes and of which the Philippines is a signatory, has adopted amendments to Annexes II, VIII and IX to the Convention which deal with the transboundary movement of plastic waste that will come into force on the 1st of January 2021.[30]

The following are the amendments made to the Annexes II, VIII and IX:

- Annex II
  - Insertion of a new entry Y48 (covers non-hazardous plastic waste which is not covered by Basel Listing B3011, including mixtures of such wastes unless they are hazardous.)
  - Prior notice and consent are required.
- Annex VIII
  - New entry A3210 which clarifies the scope of plastic wastes presumed to be hazardous.
  - Prior notice and consent are required.
- Annex IX
  - Entry B3010 is replaced with a new entry B3011, which clarifies the types of plastic wastes that are presumed not to be hazardous.
  - Prior notice and consent are not required.

Through three amendments to the annexes to the Convention, this decision specifies the new categories of plastic waste that will be subject to the Convention's:

- Control procedure for transboundary movements (Prior informed Consent (PIC) procedure) and the conditions under which this procedure applies or not
- Provisions pertaining to waste minimization
- Provisions pertaining to the environmentally sound management of wastes

Based on these amendments, the types of plastic scrap/waste that will or will not be controlled are as follows:

- All plastic waste and mixtures of plastic wastes with the exception of waste covered by entry B3011 will require the importing country's prior informed consent before it can be exported. **Types of plastic scrap/ waste that will be controlled**:[31]
  - Plastic scrap and waste that is contaminated (e.g. with food residue and/or other non-hazardous waste)
  - Plastic scrap and waste mixed with other types of scrap and waste
  - Plastic scrap and waste containing halogenated polymers (e.g., PVC)
  - Mixed plastic scrap and waste, with the exception of shipments consisting of polyethylene (PE), polypropylene (PP) and polyethylene terephthalate (PET) that meet the criteria described in Basel listing B3011

30 Basel Convention - Basel Convention Plastic Waste Amendments (2020)

31 United States Environmental Protection Agency - New international requirements for the export and import of plastic recyclables and waste (2020)

- Only batches of individual non-halogenated polymers (for a very narrow mix of polyethylene, PP and PET), that are sorted, clean, and uncontaminated and effectively destined for recycling **can be freely traded globally. Types of plastic scrap/waste that will not be controlled/not be subjected to PIC procedure** (criteria in Basel Listing B3011):[32]
  - Plastic scrap must be pre-sorted, clean, destined for "recycling in an environmentally sound manner" and be classified in one of the following groups:
  - Plastic scrap "almost exclusively" consisting of one non-halogenated polymer (e.g., PE, PP, PET, PS, ABS)
  - Plastic scrap "almost exclusively" consisting of one cured resin or condensation product (e.g., epoxy resins)
  - Plastic scrap "almost exclusively" consisting of one of a limited number of fluorinated polymers (e.g., polyvinyl fluoride)
  - Mixed plastic scrap consisting of PE, PP and PET, provided it is destined for "separate recycling" of each material, and in an environmentally sound manner, almost free from contamination and other types of wastes.

23.2 HONG KONG, CHINA'S UPDATED GUIDELINES IN COMPLIANCE WITH THE AMENDMENTS

Thus far, only Hong Kong, China has updated its guidelines to comply with the Basel Convention Plastic Waste Amendments. The following are the new controls in Hong Kong, China:

- Unrestricted plastic waste: Non-regulated plastic waste items within the Sixth Schedule of WDO (Waste Disposal Ordinance of Hong Kong, China)[33] or entry B3011 of Annex IX of Basel Convention which are almost free from contamination and other types of wastes (with contaminants of not more than 0.5%), can still be imported without the requirement of import permit if it is destined for recycling in an environmentally sound manner.[34]
- Restricted plastic waste: On the other hand, the import of plastic waste items not within the Sixth Schedule of WDO or non B3011 of Annex IX such as Y48 and A3210 will be subject to the control of permit/consent while transshipment will require a notification.
- Export permits or approval issued by the exporting countries must be available in case of import to Hong Kong, China or transshipment via Hong Kong, China.

32 United States Environmental Protection Agency - New international requirements for the export and import of plastic recyclables and waste (2020)

33 The Waste Disposal Ordinance (WDO), Cap. 354, provides legislative control on pollution caused by all forms of wastes including activities which involve the import or export of waste. It provides the statutory framework for the planning, management and control of wastes in Hong Kong, China.

34 "Environmentally sound recycling" is defined in the technical guidelines as the i*dentification and environmentally sound management of plastic wastes and for their disposal.*

APPENDIX 24:

SUMMARY OF ALL RECOMMENDED INTERVENTIONS AND ACTIONS

Table A24.1.
SUMMARY OF ALL RECOMMENDED INTERVENTIONS AND ACTIONS UNDER THIS STUDY

Recommended Interventions	#	Actions
A. Increase sorting efficiency of post-consumer collection of plastics	1	Enforce source segregation & separate collection standards and targets
	2	Enforce the role of MRFs as part of the waste collection system
	3	Develop awareness and behavior change campaigns
	4	Provide opportunities for informal sector inclusion
	5	Digitalize recyclables collection
B. Set recycled content targets across all major end-use applications	6	Accelerate policies and standards that allow recycled plastics in food-contact applications across all resins
	7	Set recycled content targets & standards for major plastic use industries
	8	Develop and launch incentives for using recycled content
	9	Define green public procurement targets for recycled content specific to plastic products
	10	Higher fee for plastic applications without minimum recycled content
C. Mandate "design for recycling" standards for all plastics, especially for packaging	11	Align industries on "design for recycling" standards
	12	Voluntarily adopt "design for recycling" standards for all plastic products
	13	Mandate national "design for recycling" standards for plastic applications
D. Encourage increase in recycling capacities (mechanical and chemical)	14	Incentivize increase in recycling capacity for all resins (PP, PE, PET)
	15	Formalize informal recyclers and reduce unfair competition from illegal recyclers
	16	Provide incentives for investments in new recycling technologies (i.e. matching grants, tax holidays, etc.)
	17	Invest in chemical recycling capacity for low value plastics
	18	Provide market pricing and volume data for virgin & recycled plastics
	19	Streamline/remove red tape on permits and reporting to government bodies
E. Create industry-specific requirements to collect post-use products	20	Set up voluntary producer responsibility system for all major end-use application industries for plastics
	21	Mandate reporting framework for plastic products
	22	Plastics value chain to incentivize co-processing of post-consumer low-value plastics
	23	Mandate collection targets specifically for packaging and other key plastic use industries
	24	Mandate a compliance scheme to meet obligations
	25	Use "soft" approaches such as recognizing best practices and business awards
F. Restrict disposal of plastics	26	Improve reporting and tracking against HS codes reporting for import/export of recycled plastic resins, semi-finished products and scrap plastics
	27	Incentivize reduction of plastics (e.g. phase-outs where relevant) and reuse systems (e.g. refillable bottles, new delivery models)
	28	Invest in treatment of organic waste
	29	Increase landfill tipping fees
	30	Mandate targets to reduce sanitary landfill disposal rates for MSW

APPENDIX 25:

ASSUMPTIONS AND CONDITIONS BEHIND CALCULATION OF THE IMPACT OF EACH INTERVENTION

Table A25.1.
ASSUMPTIONS AND CONDITIONS BEHIND CALCULATION OF THE IMPACT OF EACH INTERVENTION

	Recommendations	Modeling Assumptions	CFR Rate Increase	Value Yield Increase
1	INTERVENTIONS THAT INCREASE VALUE YIELD AND CFR RATE			
A	Increase sorting efficiency of post-consumer collection of plastics	**CFR rate:** Implementing this intervention will increase MSW sorting, reducing the non-recycled plastics by 50%. This assumes there will be a 100% collection rate of MSW. This leads to an increase in CFR rate of 36%. **Value Yield:** Implementing this intervention will increase demand for all products by approximately 10% of existing value due to better sorting. Note: Currently, 0.78 million tonnes of plastics go to landfills. Value generated from landfills is currently very minimal or non-existent.	36%	8%
B	Set recycled content targets across all major end-use applications	**CFR rate:** Assuming 30% recycled content all comes from local sources and 10% process losses occur, a minimum CFR rate of 33% is required in order to achieve 30% recycled content target. Also, currently it is assumed 20% of all recycled plastics is exported. When recycled content targets are set, it is assumed only 10% of all recycled plastics will be exported (i.e. local demand for recycled plastics will increase from 80% to 90% of all recycled plastics). We need 37% CFR rate such that 90% of that becomes 33% CFR rate. Thus, the increase in CFR rate needed is 37%-28%=9%. **Value Yield:** Implementing this intervention will increase demand for all products by approximately 15% of existing value (82%*15% = 12%)	9%	12%
C	Mandate "design for recycling" standards for all plastics, especially for packaging	**CFR rate:** Based on Ellen MacArthur Foundation's New Plastics Economy Catalyzing Action report, without fundamental redesign and innovation about 30% of plastic packaging will never be reused or recycled. Assuming this 30% can be applied across all applications of plastics moves CFR to right by 30%. **Value Yield:** Based on the above-mentioned report, implementing four areas of packaging design changes could have a positive impact on recycling economics amounting to USD 90-140 per tonne collected.	30%	14%
2	INTERVENTIONS THAT INCREASE CFR RATE			
D	Encourage increase in recycling capacities (mechanical and chemical)	**CFR rate:** 100% recycling capacity is needed to achieve very high recycling rates for plastics. Assuming the current value yield stays the same, recycling capacity increases to 100%. **Value Yield:** No change	72%	0%

E	Create industry-specific requirements to collect post-use products	**CFR Rate:** Assuming a 90% CFR rate target for packaging and 50% CFR rate target for all non-packaging applications. 53% of all plastics is consumed by packaging and the rest by non-packaging so this provides a weighted average CFR rate of 71% to be reached. After factoring in the existing CFR rate of 28%, the increase in CFR rate is 44%. **Value Yield:** No change	44%	0%
F	Restrict disposal of plastics	**CFR Rate:** Implementing this intervention will reduce all non-recycled plastics from entering landfills by 50%. This leads to an increase in CFR rate of 36%. **Value Yield:** No change	36%	0%

APPENDIX 26:

EXISTING INDUSTRY-LED EFFORTS

This section reviews the leading existing industry-led efforts within the Philippines to collect and recycle plastics.

Philippine Alliance for Recycling and Materials Sustainability (PARMS)

PARMS is a non-profit, multi-stakeholder coalition that was founded in 2014 to bring together stakeholders across the recycling value chain. This includes manufacturers, industry groups, retail groups, waste consolidators and haulers, recyclers and non-government and government entities.[35] Its objective is to develop and implement a holistic and comprehensive program to increase resource recovery and reduce landfill dependence towards zero waste.

PARMS has identified four initiatives that need to be developed in the Philippines—increased recycling, post-consumer waste solutions, innovation in packaging, and evidence-based policy advocacy. In January 2020, PARMS and its members made a declaration on Zero Waste to Nature: Ambition 2030, which is a declaration of commitment to initiate and support efforts to reduce and collect waste, in line with the 2025 sustainable packaging commitments of some global brands.[36] As part of this, PARMS has committed to developing and implementing a roadmap with short (2022), medium (2025) and long-term (2030) targets to guide sound and implementable actions that contribute towards the goals of Zero Waste to Nature.[37]

35 Nestlé - Philippine Alliance for Recycling and Materials Sustainability (PARMS) turns over proposed design of recycling facility to Parañaque City (2018)

36 Unilever - PARMS declares Zero Waste to Nature: Ambition 2030 (2020)

37 Asean Times - Ambisyon 2030 Zero Waste to Nature (2020)

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