



**PRIVATE SECTOR
INITIATIVES TO COMBAT
PLASTIC WASTE**

NAST Multi-Sectoral Forum on Plastic Waste

Presentation Outline

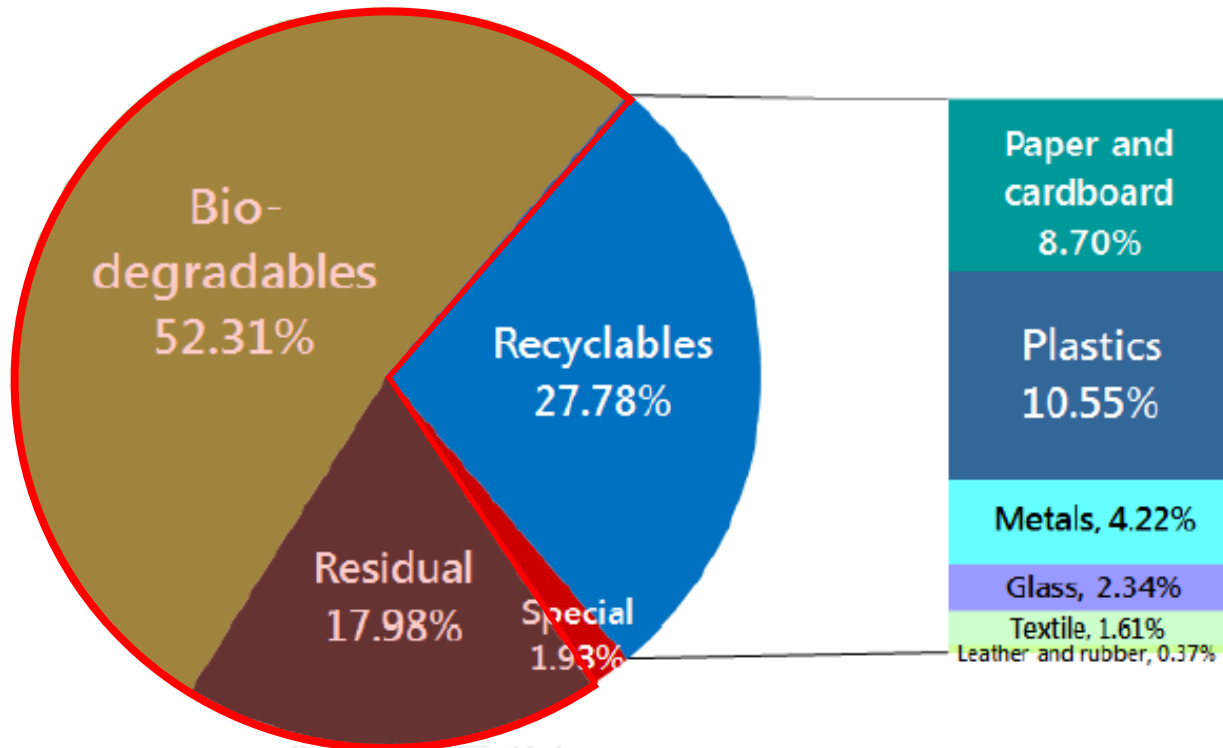
- Philippine Solid Waste Status
- Plastics Recycling in the Philippines
- Global and Local Actions to address Marine Litter and Micro Plastics
- Industry Initiatives in Addressing Plastic Waste and Single Use Plastics

Philippine Solid Waste Situation (RA9003)

Indicator	National	Metro Manila
Waste generation 2019 projected	44,610 tons/day	10,078 tons/day
	111,526,230 tons/yr	14,194,011 tons/yr
Per capita	0.32 – 0.71	0.71



Percentage (%) by weight of MSW fractions in the Philippines



Percentage (%) contribution of the various sources of MSW

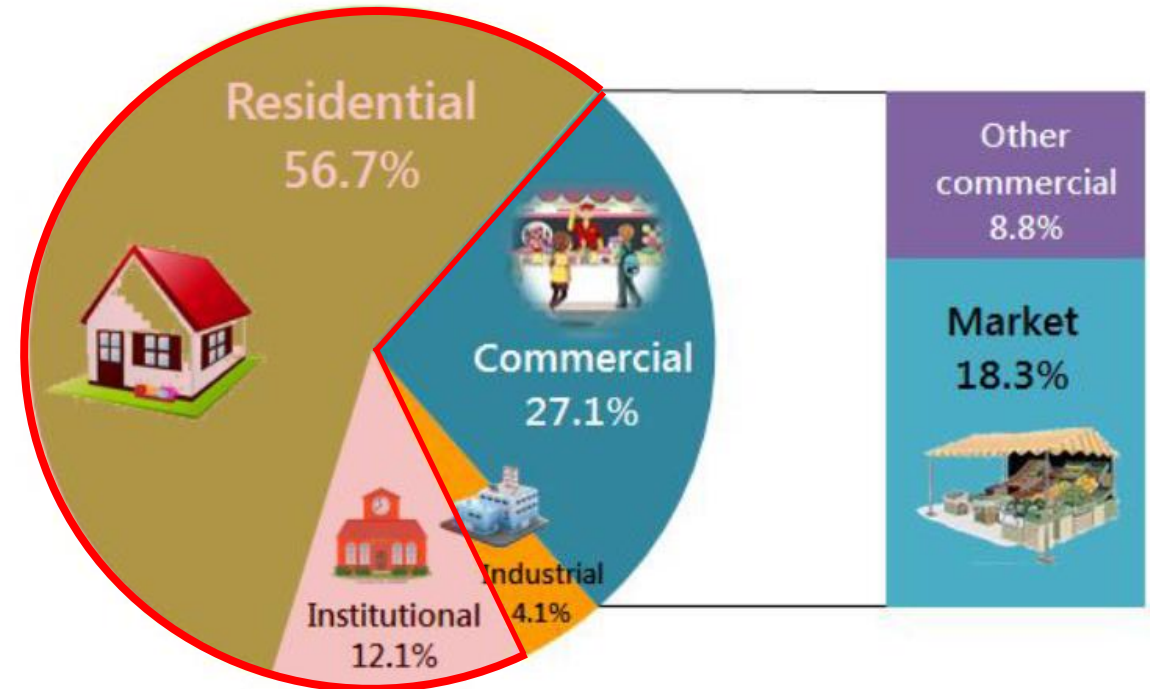


Figure 6. Sources of municipal solid waste (MSW) in the Philippines

LGU Compliance Updates (RA9003)

Philippine Solid Waste Situation (RA9003)

Compliance to Materials Recovery Facilities

31% served by MRFs



SWMD, 2015

Source: DENR-EIS-SWMD, 2014 State of the Environment Report, NSWMC ed.

Philippine Solid Waste Situation (RA9003)

Compliance to Sanitary Landfills

Intermediate Soil Cover

Embankment/Cell Separation

Percentage of population with Access to SLF 30%



Parameter	Year	Unit
	2015	
Population of the Philippines	101,883,764	Capita
Number of operating SLFs	101	SLFs
Number of LGUs with access to SLFs ^a	228	LGUs
Percent of LGUs ^b with access to SLFs	13.95%	%

SWMD, 2015

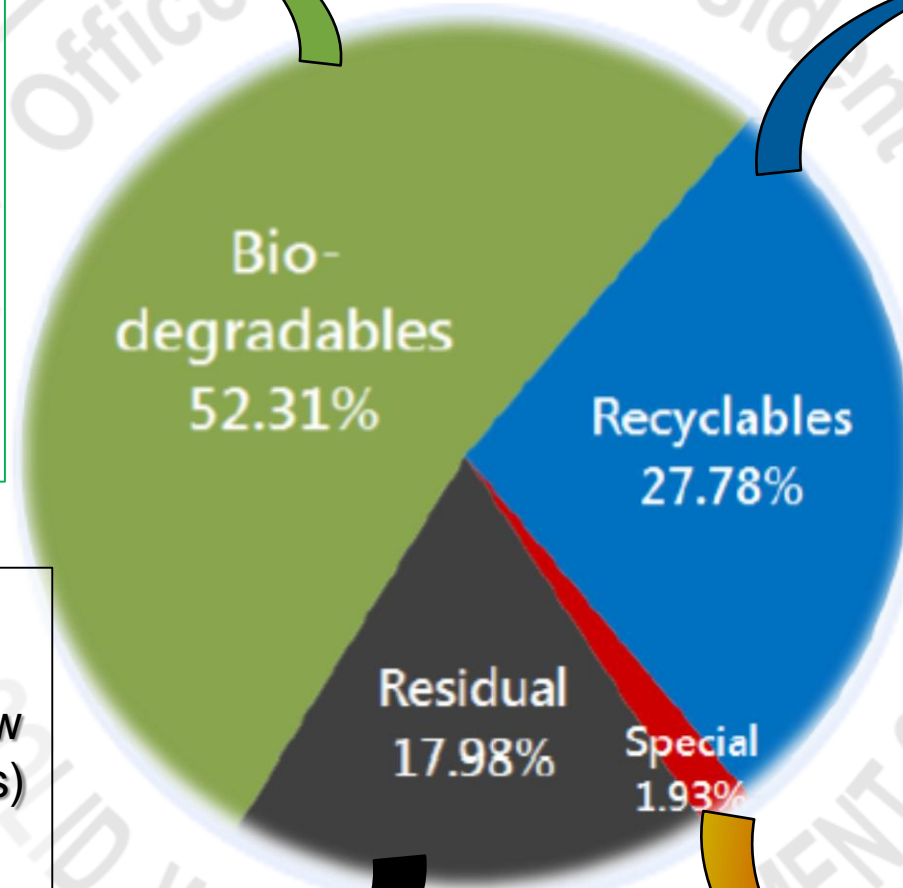
Source: DENR-EIS-SWMD, 2014 State of the Environment Report, NSWMC ed.

NSWMC initiatives at a glance...



- ✓ Food Waste Management Program
- ✓ Composting Guidelines Developed
 - ✓ Animal Feeds
 - ✓ Backyard Composting
 - ✓ Centralized Composting
- ✓ Energy Recovery

- ✓ Arts & Crafts
- ✓ Alternative Technologies (i.e. Construction Materials like hollow blocks, eco-bricks, lumber, roads)
- ✓ Energy Recovery (RDF, Fuel, Electricity)



- ✓ Increased Recovery for Recycling Rates
- ✓ Promote Consumption shift (Disposables to Recyclables)

- ✓ Hazardous Waste Management at City/Municipality Centers (DENR)
- ✓ Medical Waste Management Program (DOH)
- ✓ Treated and Bulky Waste Proper SLF Disposal



**PLASTICS
ARE
100%
RECYCLABLE**

**All it needs
is a 100%
commitment
from each and
everyone
of us**

Technology is being continually upgraded to improve the process of recycling.



PLASTIC RECYCLING



RESIN IDENTIFICATION CODES



Descriptions

Properties

Packaging

Recycled

Applications

Products



Polyethylene Terephthalate (PET, PETE). PET is clear, tough, and has good gas and moisture barrier properties. Commonly used in soft drink bottles and many injection molded consumer product containers. Other applications include strapping and both food and non-food containers. Cleaned, recycled PET flakes and pellets are in great demand for spinning fiber for carpet yarns, producing fiberfill and geo-textiles. Nickname: Polyester.

Clarity, strength, toughness, barrier to gas and moisture, resistance to heat

Plastic soft drink, water, sports drink, beer, mouthwash, catsup and salad dressing bottles. Peanut butter, pickle, jelly and jam jars. Ovenable film and ovenable prepared food trays.

Fiber, tote bags, clothing, film and sheet, food and beverage containers, carpet, strapping, fleece wear, luggage and bottles.



High Density Polyethylene (HDPE). HDPE is used to make bottles for milk, juice, water and laundry products. Unpigmented bottles are translucent, have good barrier properties and stiffness, and are well suited to packaging products with a short shelf life such as milk. Because HDPE has good chemical resistance, it is used for packaging many household and industrial chemicals such as detergents and bleach. Pigmented HDPE bottles have better stress crack resistance than unpigmented HDPE bottles.

Stiffness, strength, toughness, resistance to chemicals and moisture, permeability to gas, ease of processing, and ease of forming.

Milk, water, juice, cosmetic, shampoo, dish and laundry detergent bottles; yogurt and margarine tubs; cereal box liners; grocery, trash and retail bags.

Liquid laundry detergent, shampoo, conditioner and motor oil bottles; pipe, buckets, crates, flower pots, garden edging, film and sheet, recycling bins, benches, dog houses, plastic lumber, floor tiles, picnic tables, fencing.



Vinyl (Polyvinyl Chloride or PVC): In addition to its stable physical properties, PVC has excellent chemical resistance, good weatherability, flow characteristics and stable electrical properties. The diverse slate of vinyl products can be broadly divided into rigid and flexible materials. Bottles and packaging sheet are major rigid markets, but it is also widely used in the construction market for such applications as pipes and fittings, siding, carpet backing and windows. Flexible vinyl is used in wire and cable insulation, film and sheet, floor coverings synthetic leather products, coatings, blood bags, medical tubing and many other applications.

Versatility, clarity, ease of blending, strength, toughness, resistance to grease, oil and chemicals.

Clear food and non-food packaging, medical tubing, wire and cable insulation, film and sheet, construction products such as pipes, fittings, siding, floor tiles, carpet backing and window frames..

Packaging, loose-leaf binders, decking, paneling, gutters, mud flaps, film and sheet, floor tiles and mats, resilient flooring, cassette trays, electrical boxes, cables, traffic cones, garden hose, mobile home skirting.



Low Density Polyethylene (LDPE).Used predominately in film applications due to its toughness, flexibility and relative transparency, making it popular for use in applications where heat sealing is necessary. LDPE is also used to manufacture some flexible lids and bottles and it is used in wire and cable applications

Ease of processing, strength, toughness, flexibility, ease of sealing, barrier to moisture.

Dry cleaning, bread and frozen food bags, squeezable bottles, e.g. honey, mustard.

Shipping envelopes, garbage can liners, floor tile, furniture, film and sheet, compost bins, paneling, trash cans, landscape timber, lumber



Polypropylene (PP). Polypropylene has good chemical resistance, is strong, and has a high melting point making it good for hot-fill liquids. PP is found in flexible and rigid packaging to fibers and large molded parts for automotive and consumer products.

Strength, toughness, resistance to heat, chemicals, grease and oil, versatile, barrier to moisture.

Catsup bottles, yogurt containers and margarine tubs, medicine bottles

Automobile battery cases, signal lights, battery cables, brooms, brushes, ice scrapers, oil funnels, bicycle racks, rakes, bins, pallets, sheeting, trays.



Polystyrene (PS). Polystyrene is a versatile plastic that can be rigid or foamed. General purpose polystyrene is clear, hard and brittle. It has a relatively low melting point. Typical applications include protective packaging, containers, lids, cups, bottles and trays.

Versatility, insulation, clarity, easily formed

Compact disc jackets, food service applications, grocery store meat trays, egg cartons, aspirin bottles, cups, plates, cutlery.

Thermometers, light switch plates, thermal insulation, egg cartons, vents, desk trays, rulers, license plate frames, foam packing, foam plates, cups, utensils



Other. Use of this code indicates that the package in question is made with a resin other than the six listed above, or is made of more than one resin listed above, and used in a multi-layer combination.

Dependent on resin or combination of resins

Three and five gallon reusable water bottles, some citrus juice and catsup bottles.

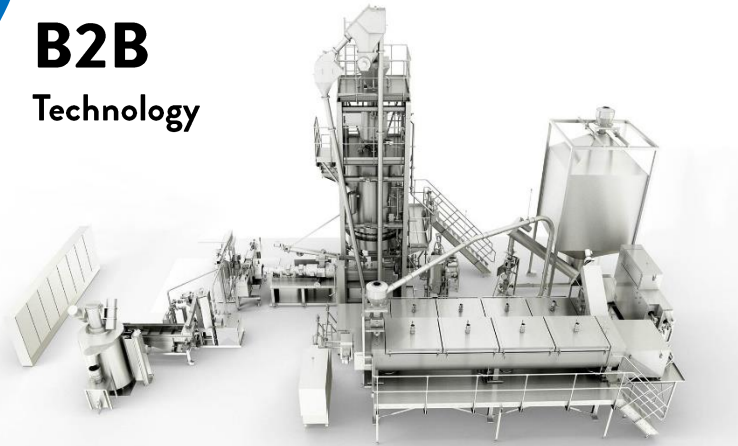
Bottles, plastic lumber applications.



**Bailed/ Washed/ Grinded/
Pelletized for
EXPORT**



**B2B
Technology**





HDPE



LDPE



PP

PE or PP Rigids “*Sibakin*”

Polyethylene & Polypropylene “Hard Plastic”

- used in rigid applications such as tables & chairs, PE pipes, bottles & closures, pallets, crates, drums and other hard plastics.





PE or PP Films and Bags

Polyethylene & Polypropylene “Flexibles”

- products which are used in flexible applications such as bags, liners, and other single or mono-component soft plastics.



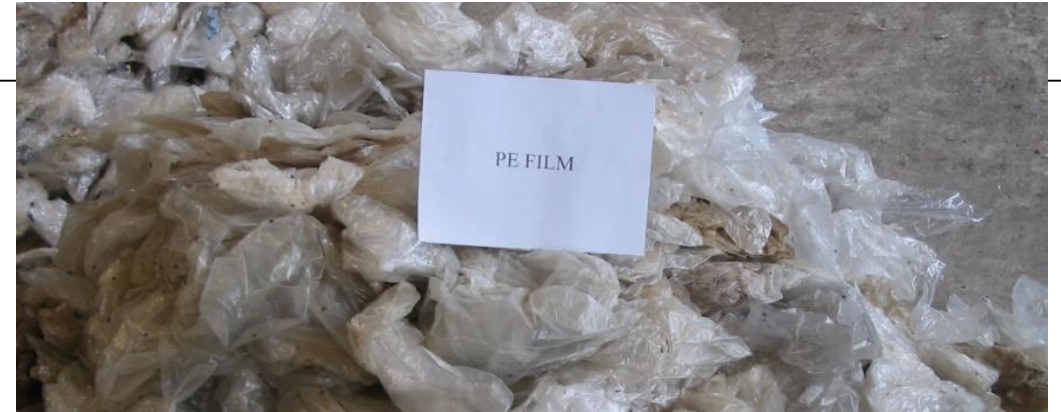
HDPE



LDPE



PP



Process Flow for Styro Recycling



POLYSTYRENE PACKAGING
COUNCIL OF THE PHILIPPINES



PS
RECYCLING

WE

RECOVER
CYCLE

6 polystyrene



Post- consumer waste of
styro products



Melted blocks / ingots



Resins / pelletized



By products from styro wastes

Mechanical Recycling for PLASTICS



SORTING



RECYCLED or PELLETIZED PLASTIC



GRINDING & PELLETIZING



**PROCESSING
Trash Bags,
among others**



Residuals (Alternative Technologies)



- RESULTS OBTAINED**
- Specific gravity increased with modified asphalt content
 - High stability at 6.0% modified asphalt content
 - Flow increased with modified asphalt content
 - Air voids decreased as modified asphalt content increases



Residuals (Energy Recovery)

SUKI SMALL-SCALE GARBAGE GASIFIER PLANT

Introducing the latest development in the field of garbage gasification by converting garbage into a clean gas to produce heat, mechanical and electrical power.

Suki Trading Corporation now can customize the design of garbage gasifier plant on job-to-order basis, ranging from 10 - 100 kW using surplus spark-ignition or imported gas engine.

The Suki gasifier plant technology is a combination of the CRHET moving-bed downdraft reactor and the improved design of gas conditioning devices. This gasifier plant can provide clean gaseous fuel that is suitable for use in rice milling operation as well as in crop irrigation.

Applications:

- Power supply for irrigation pump, rice mill, and other farmsteads, etc.
- Barangay chlorinator for residential, community hall and street lighting, including micro business enterprises, etc.

Model	400	500	600	1000	1500
Power Output (kW)	10	20	50	75	100
Rice Mill Consumption (kg/hr)	10	42	73	118	180
Engine / Generator	Surplus spark-ignition engine with AL-synchronous generator or imported gas engine generator set				
Floor Area (m x m x m)	5.0 x 5.0 x 4.0	5.5 x 5.5 x 4.5	6.0 x 6.0 x 5.0	6.5 x 6.5 x 5.5	6.5 x 7.0 x 6.0

For details, please contact: Engr. Vic Ocan, Suki Trading Corporation, Agos, Sultan, Lapu-Lapu City, Philippines.
 Mobile: +639176248119 Email: sukitradingcenter@yahoo.com Website: www.sukitradingcorp.com

Other Alternatives

Plastic Waste to Fuel

TECHNOLOGY

The technology is modular in concept and may be deployed in 5, 10 and 20 ton/day capacities. With this design, operation can be carried out in smaller plants and processing may be situated wherever it is deemed necessary.

Assorted plastics are first shredded into evenly sized pieces and are entered into an agglomeration chamber. It then enters a feeding screw where it is melted and the polymers are mixed with a catalyst. The melted plastic goes to a specially designed pyrolysis chamber and depolymerization occurs, where hydrocarbon gases are being produced. It then passes through distillation to separate different hydrocarbon chains, filtration, and centrifuge to remove contaminants and impurities. The light gases produced are then purified, compressed and stored. Provision will be made as to make this light gas into liquefied petroleum gas (LPG).

The process is done entirely inside a vacuum, hence no resultant chemicals are released into the environment. The conversion efficiency rate is 75% to 80% depending on feedstock components.

Prototype conversion plant in Bacolod

Diesel & Gasoline end products

Cement Kiln Co-processing Operation

- Traditional Raw Materials**
 - Limestone
 - Silica Sand
 - Iron Corrective
- Alternative Raw Materials (AR)**
- Traditional Fuel**
 - Coal
 - Bunker Fuel
- Alternative Fuel (AF)**

CLINKER

Holcim Philippines **Strength. Performance. Passion** 211

UPCOMING PROJECTS:

QC Project Consortium: MPIC – COVANTA – MACQUAIRE JV with QC Gov PhP 15B investment,
 MBT (Mech. Bio. Treatment) + Stoker
 35 yr concession agreement + 15 yrs; 2200 TPD,
 MOEJ (Envi. Ministry Japan)
 Davao
 Waste to Worth Project
 Pampanga, Laguna & Dagupan Projects coming soon



Solutions to plastic pollution and barriers to local implementation in Asia

25 April 2019, Singapore

Kakuko Nagatani-Yoshida, UN Environment Regional Office for Asia and the Pacific
Email: nagatani-yoshida@un.org



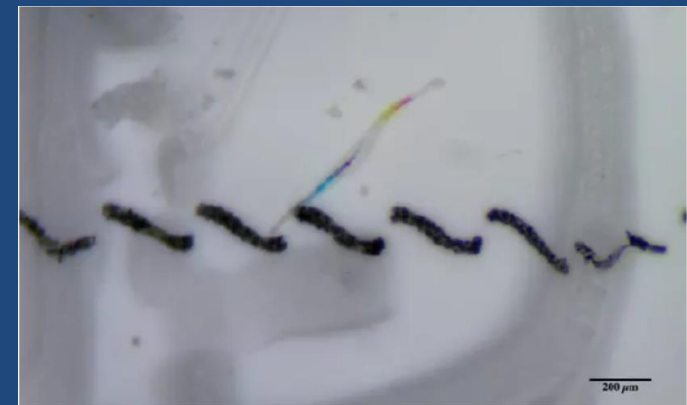
Credit: Kakuko Yoshida

Marine litter is ‘any persistent, manufactured or processed solid material discarded, disposed of or abandoned in the marine and coastal environment’.

Microplastics range in size, but are commonly defined as plastic particles of less than 5mm diameter (for monitoring and assessment purposes)

Source:

- UNEP (1995). Global Programme of Action for the Protection of the Marine Environment from Land-based Activities
- UNEP (2009). Marine litter: A global challenge, Nairobi.
- UN Environment Programme (2016) Marine Litter Legislation: A Toolkit for Policymakers.
- GESAMP (2019). Report and Studies No. 99 Guidelines for The Monitoring and Assessment of Plastic Litter in the Ocean



A colourful microfiber of plastic found in bottled water. Photograph: Abigail Barrows



United Nations
Environment Assembly of the
United Nations Environment
Programme

United Nations Environment Assembly of the
United Nations Environment Programme
Fourth session
Nairobi, 11–15 March 2019

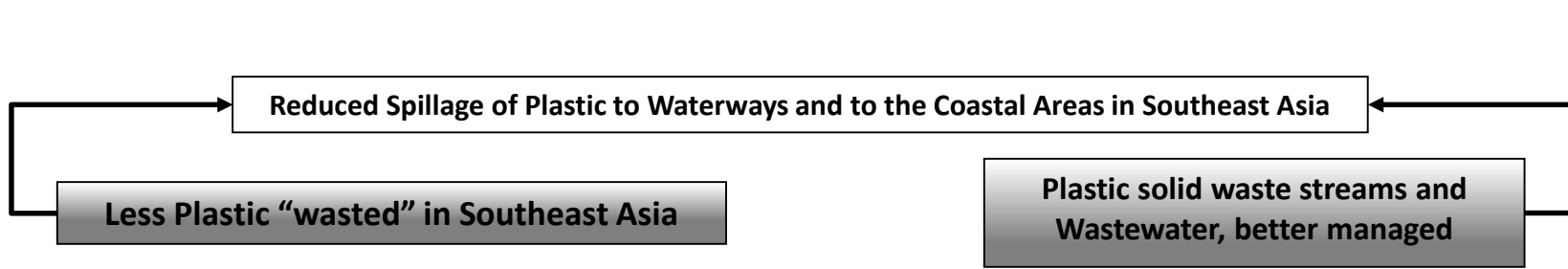
Marine plastic litter and microplastics*

UNEP/EA.4/L.7

Distr.: Limited
14 March 2019

Original: English

Decides to strengthen coordination and cooperation by establishing
a multi-stakeholder platform within UNEP, to take immediate action towards the **long-term elimination of discharges of litter and microplastics through a life cycle approach**, into the oceans.



Reduction in most harmful and difficult to recycle plastic

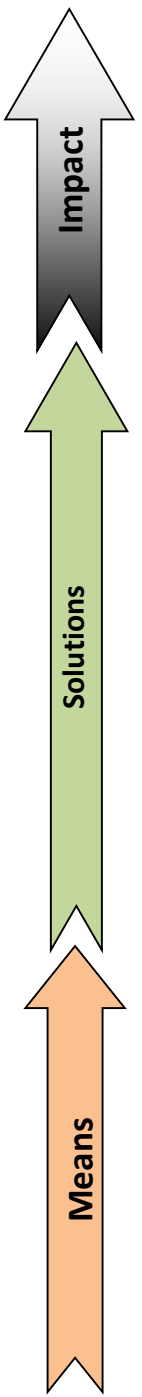
- Switch – over to non – plastic packaging material
- Variety and volume of alternative packaging increased
- Incentives for plastic reduction

Increase in plastic re-use and recycle

- Increase in plastic segregation at source
- Regionally coordinated national standards on quality and types of plastics for recycling
- Incentives plastic recycling

Compliance with existing regulations on disposal and discharge

- Increased formal waste collection
- Plastics in waterways and coastal areas intercepted
- Reduction in illegal dumping through increased surveillance and compliance at critical spillage sites and occasions





**Asia and the Pacific Office
The United Nations Building
Rajadamnern Nok Avenue, Dusit
Bangkok 10200, Thailand**

NATIONAL (PHILIPPINE) ACTION ON MARINE DEBRIS

- Lead Agency: Department of Environment & Natural Resources
- Bureaus and Divisions Involved
 - Biodiversity Management Bureau (BMB) – developing a National Action Plan on Marine Debris
 - Environment Management Bureau
 - Environmental Research and Laboratory Services Division – Research on Microplastics
 - Solid Waste Management Division – not too involved
 - Climate Change Division – Chief attended the UNEA 4 and spearheading the MPL (Marine Plastic Litter) action plan




Working Draft:

Philippine National Action
Plan on Marine Plastic Litter

Action Plan (Draft) – for discussion

At the municipal and domestic level

- ▶ Reduce unnecessary use of single-use plastic through a national ban
- ▶ Shift/transform sachet economy into more sustainable business packaging models through private sector-led innovations, especially by fast moving consumer goods; or through regulation/prescriptive measures, if needed, including support or incentives to low-income households towards sustainable choices linked to the sachet economy
- ▶ Adopt Extended Producer Responsibility, whereby producers are significantly responsible, whether financially and/or physically to treat or dispose post-consumer products, as a national policy, including increasing private sector-led recovery and recycling of plastics into secondary materials as well as feasibility of deposit schemes of high value PET bottles

A collection of items including a chessboard, medals, a compass, and glasses. The chessboard is in the top left, with a red ribbon and a blue ribbon. A compass is in the bottom left. A pair of glasses is in the center. A medal is in the middle right.

The Ecological Solid Waste Management Act of 2000 (Republic Act 9003)

Updates on NEAP
(Non-Environmentally
Acceptable Products)



RA 9003, Article 4, Section 29

Non-Environmentally Acceptable Products. -- Within one (1) year from the effectivity of this Act, the Commission shall, after public notice and hearing, prepare a list of non-environmentally acceptable products as defined in this Act that shall be prohibited according to a schedule that shall be prepared by the Commission: Provided, however, That non-environmentally acceptable products shall not be prohibited unless the Commission first finds that there are alternatives available which are available to consumers at no more than ten percent (10%) greater cost than the disposable product.



RA 9003, Article 4, Section 29

Notwithstanding any other provision to the contrary, this section shall not apply to:

- a) Packaging used at *hospitals, nursing homes or other medical facilities*; and
- b) Any packaging which is not environmentally acceptable, but for which there is *no commercially available alternative* as determined by the Commission.

The Commission shall annually review and update the list of prohibited non-environmentally acceptable products.



DAO 01-34, Rule III, Section 1

“Non-environmentally acceptable products or packaging” shall refer to products or packaging that are unsafe in production, use, post-consumer use, or that produce or release harmful by-products when discarded.



NSWMC Resolution No. 19, Series of 2009

Resolution adopting the Guidelines on the Phasing Out of Non Environmentally Acceptable (NEA) Products and Packaging Materials

Guidelines prepared by Technical Working Committee on the Phasing-Out of Non-Environmentally Acceptable Products and Packaging



NSWMC Resolution No. 19, Series of 2009

NEAP Categories

- ◆ Plastic
- ◆ Construction materials
- ◆ Electronic products
- ◆ Products containing heavy metals



NSWMC Resolution No. 19, Series of 2009

Plastic Products Evaluated

- ◆ Carrier bag – HDPE and LLDPE/LDPE
- ◆ Foam Polystyrene/Polystyrene Paper
“Styrofoam/Styrophor”



NSWMC Resolution No. __, Series of 2019
Plastic Products for Evaluation

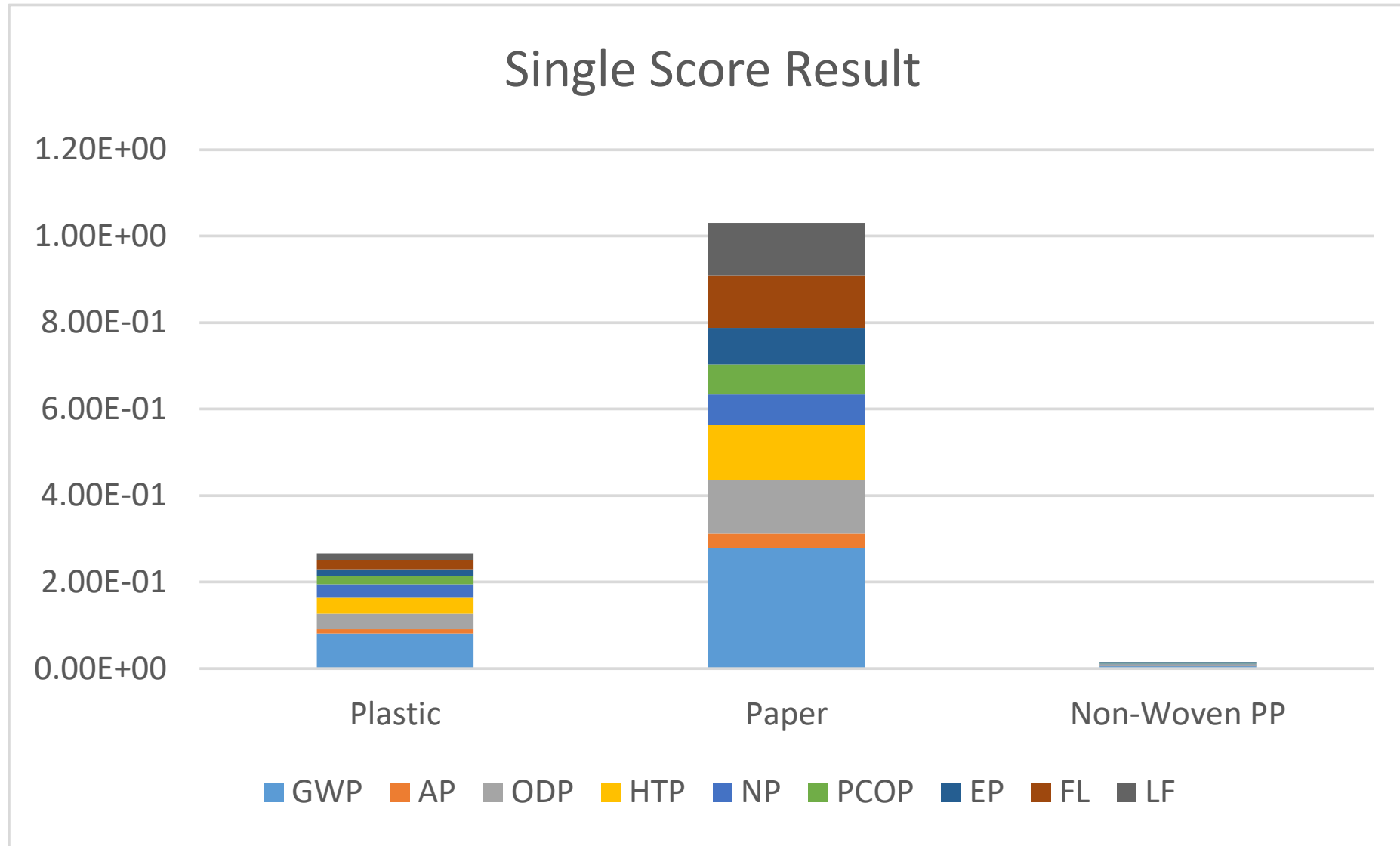
◆ Single Use Plastics

- Specific Product Items to be identified by the TWG

Life Cycle Assessment of Carrying Bags Options for Metro Manila, PHILIPPINES

J.B. Manuel M. Biona, Ph.D.
Project Consultant

Results: Baseline Scenario

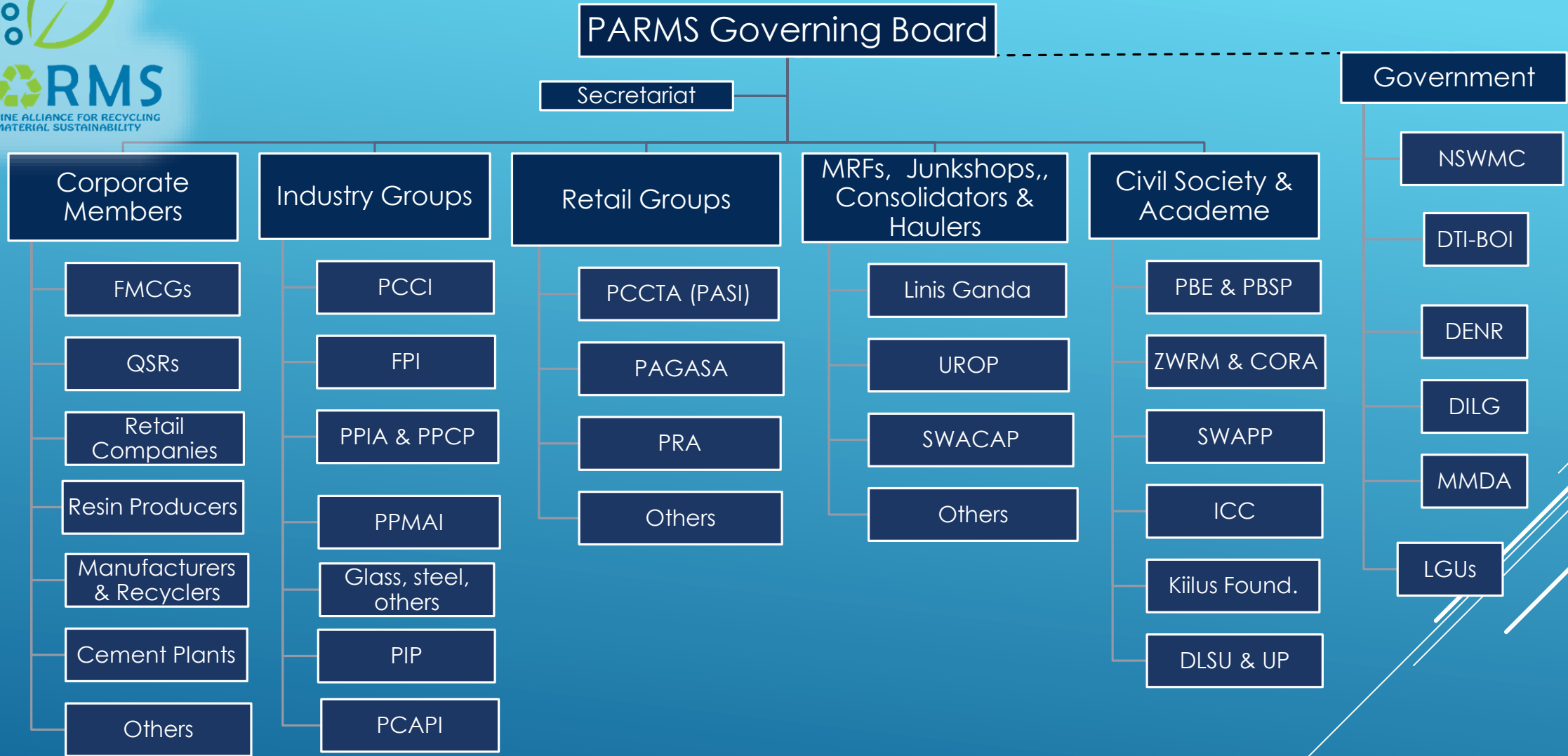


Conclusions

- ▶ REUSABLE (Non-Woven PP) provides the least impact among the options evaluated
- ▶ Based on the cost of remediation, the flooding contribution of paper bags compared to plastic is higher. It must be however that the approach adopted is limited in scope due to the availability of cost and waste data.
- ▶ Non-Biodegradable Plastic bags is more environmentally desirable compared to paper in all impact areas. This is primarily traced to their lower material quantity used.



Philippine Alliance for RECYCLING and Material Sustainability



Objective: “Develop & Implement a **Holistic & Comprehensive Program** to Increase **Resource Recovery** & Reduce Landfill Dependence towards **Zero Waste**”

Concept Adopted: **Full Waste Recovery and Recycling program**

FULL WASTE RECOVERY & RECYCLING PROGRAM

- ▶ **Component 1: IEC Campaign.** Developed and geared towards proper disposal, recovery, and treatment. (using marine litter, health, etc)
- ▶ **Component 2: Recovery System.** Working with **Existing Programs** (e.g. Waste Markets, DENR-DepEd's "Eco Savers", Unilever's "Misis Walastik Redemption ng Plastik" and Nestle's "Laki sa Tibay") to collect residual plastic for conversion to a marketable product. Enhancing local RECYCLING PROGRAMS.
- ▶ **Component 3: Collection from Recovery Points.** LGU through Barangays or LGU ENROS to bring it to a common storage area or treatment facility in line with waste diversion targets.
- ▶ **Component 4: Technical Assessment.** Work with DOST, Academe and other Industry "experts" to assess existing technologies (from hollow blocks, bricks, school chairs) including the proper BAT (Best Available Technologies) BEP (Best Environmental Practice and keep an eye on emerging and even developing new technologies
- ▶ **Component 5: Treatment Facility.** Following the model of GREEN ANTZ or Villar SIPAG's plastic factory. Managed by the community or cooperatives (supported by the LGU) under the supervision of PARMs to control the operations, monitor the data and will have the right to retrieve (confiscate) the equipment if it is not running. With a business model that runs itself without need of external funding support. LGU provides the land and structure, Industry provides the Equipment with no cost recovery or develop a revolving fund (if financial feasibility allows)
- ▶ **Component 6: Market Development.** Enhance market, ensures project viability and sustainability

**R&R
Depot**

Philippine Alliance for RECYCLING and Material Sustainability

**Full Waste Recovery & Recycling
Program for Metro Manila**



PARMS STRATEGY

Post-Consumer Waste Solutions

Market-based collection

Residuals Processing Facility

Sustainable Market

Innovation in Packaging

Redesign for recyclability:
Multi-layer mono-material

Guaranteed off-take of
products with recycled
content

Enabling investment in
recycling facility

Evidence-Based Policy Advocacy

Promote Extended
Stakeholders Responsibility
(ESR)

Survey of Legislative
Landscape

Support Data Need of Life
Cycle Sustainability
Assessment



A collaborative PARTNERSHIP to set up a PLASTICS RECYCLING FACILITY for low to no value flexible plastics packaging waste. Developing a R&D facility that aims to set up a business model that can be replicated in other cities.

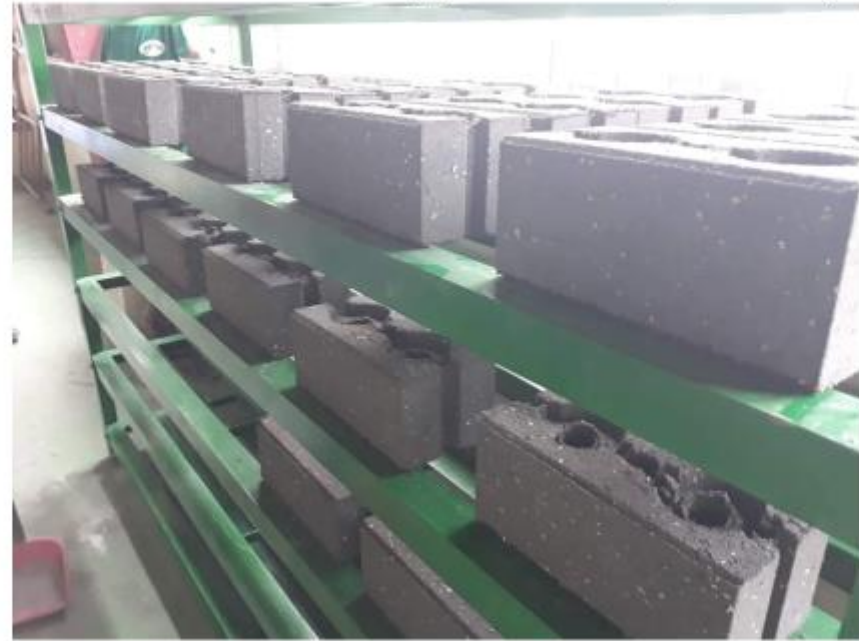
Investing Partners



Supporting Partners



First batch of Eco-bricks manually produced in Pque Facility



**A COMMITTED PARTNERSHIP FOR A ZERO-WASTE FUTURE:
DESIGN TURNOVER FOR THE PARMs - PARANAQUE RECYCLING PLANT**



VISUAL RENDERING OF THE PARMs RECYCLING PLANT



Paranaque Facility



- Invested in Equipment
- Test Produced Products
- Currently Undertaking Testing

Nest Steps:

- Create Market (LRTA, Ayala Land)

FOR REFERENCE

Packaging Transition towards Circular Economy

- ▶ Design for Recyclability & Increase Recyclable inputs
 - ▶ rPET bottles fit for Beverage containers
 - ▶ Shift to Rigid (PE & PP has high recovery for recycling rates and multilayer applications available to apply Post Consumer Recyclables “PCR” integration)
 - ▶ Avoid colors for rPET and rigid PE/PP packaging
 - ▶ Flexible Packaging: shift to mono-multilayer structures (from OPP/PET AL/PE to OPP/CPM/CPP or OPE/PEM/PE)
- ▶ Develop RECOVERY programs or participate in voluntary Extended Stakeholders Responsibility (ESR) programs



Short Term DOABLE Goals

- Develop a **Food Waste Management Program**
- Minimize **DISPOSABLE** packaging from sources where feasible (i.e. hotels, food chains, restaurants, institutions) and shift to **RECYCLABLES** and set voluntary **RECYCLING Targets**– Change of local policies required.
- Strengthen **market** for construction materials and other products made from waste by providing incentives and/or mandating its use through the Green Procurement Programs
- Enhance **Partnership** with ALL Sectors for Residuals Collection under the Full Waste Recovery Program.



Philippine
Alliance for
Recycling
& Material
Sustainability



www.denr.gov.ph/nswmc



Crispian Lao

NSWMC Vice Chair/Commissioner
(Recycling Sector)
PCCI Environment Committee
PARMS (Recycling Alliance) President
PPIA Past President
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