# Plans For Using Recycled Materials To Achieve Zero Plastic

September 27th, 2024

**Korea Resource Circulation Service Agency**

# Plastic Recycled Plastic Material Usage & Carbon Neutral

Carbon Neutral (Net – Zero) & De-Petroleum

Reduction
Fossil Fuel Usage
(Replacing 60% of Oil Usage)

Reduction
Petroleum-based Plastics
(Replacing 40% of Oil Usage)

Energy Transition

- Electricity
- Mobility
- Industry

Circular Economy

- Plastics
- Resources
- Industry

# CONTENTS

# Ⅰ. KORA & EPR System

# KORA (Korea Resource Circulation Service Agency)

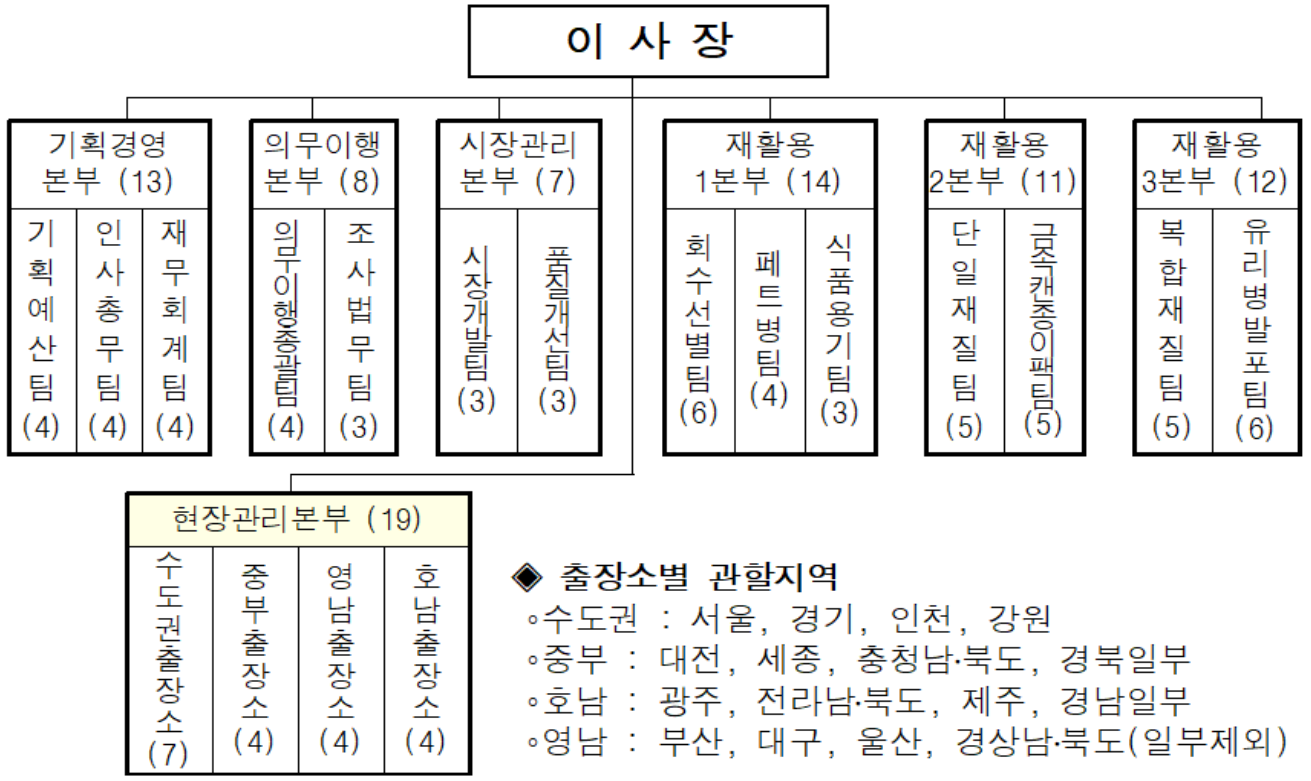
**KORA is a public-benefit corporation established to support the operation of product and packaging material collection and recycling businesses, and to promote the public benefit through the stable supply and demand of recyclable resources**

- (Establishment Basis) Article 28-2 of the Act on the Promotion of Saving and Recycling of Resources: ① Associations may jointly establish a Recycling Resource Distribution Support Center (hereinafter referred to as 'Distribution Support Center') to collect and recycle waste from products and packaging materials as per Article 16(1). (December 23, 2013)

한국순환자원유통지원센터
Korea Resource Circulation Service Agency

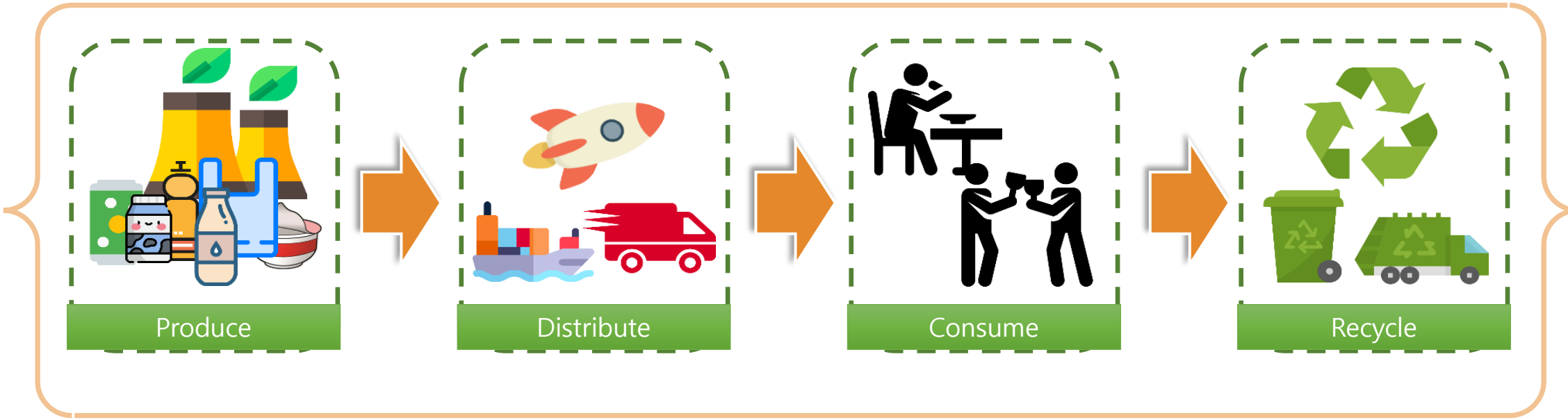
Established in 2013,
it is a non-profit public-benefit corporation with Lee Myung-Hwan as the 6th Chairman.

It has 6 headquarters (14 teams),
4 branch offices in operation
(a total of 85 employees as of May 2024).



# EPR System

## Extended Producer Responsibility (EPR)




A system that imposes a certain amount of recycling obligation on manufacturers or importers of products or packaging, and if these obligations are not fulfilled, a recycling fee exceeding the cost of recycling is charged to the producer.

# EPR System

## ☐ Recycling obligated producer

A producer obligated to recycle who manufactures, uses, or imports **packaging subject to recycling obligations**, and whose annual sales (revenue) and delivery (import) amounts exceed certain criteria.

## ☐ Items for recycling obligation : classified by item and packaging

**Top 4 Packaging Materials**
**(KPRC-KORA)**

※ 소비자의 편의를 위해 대상 포장재에 대한 분리배출 표시제 시행 중

**24 Product Categories**
**(13 Cooperative Associations)**

## ☐ Recycling obligation quantity =

**Current year's product or packaging delivered quantity × recycling obligation percentage**

(announced by the Minister of Environment yearly)

The Minister of Environment sets and announces the mandatory recycling rates for each item, considering the amount of separately disposed recyclable resources, recycling performance, and recycling conditions.

## ☐ Methods for fulfilling recycling obligations

KPRC

KORA

**Join and pay contributions to the Recycling Business Mutual Aid Association. For packaging materials, recycling obligations are jointly fulfilled by KPRC and KORA.**

**Direct Handling by Producers or Entrusting**
(Realistically very difficult)

# EPR Items

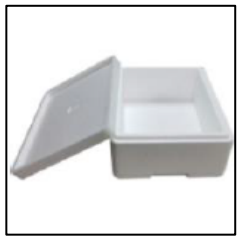
## Packing Material (4 Types)

Carton Packs

Glass Bottles

Metal Cans

PET



EPS

PSP

PVC

PE,PP, PS

Film/Sheettype

Plastic (Synthetic Resin)

## Product Range (24 Types)

Batteries

Tires

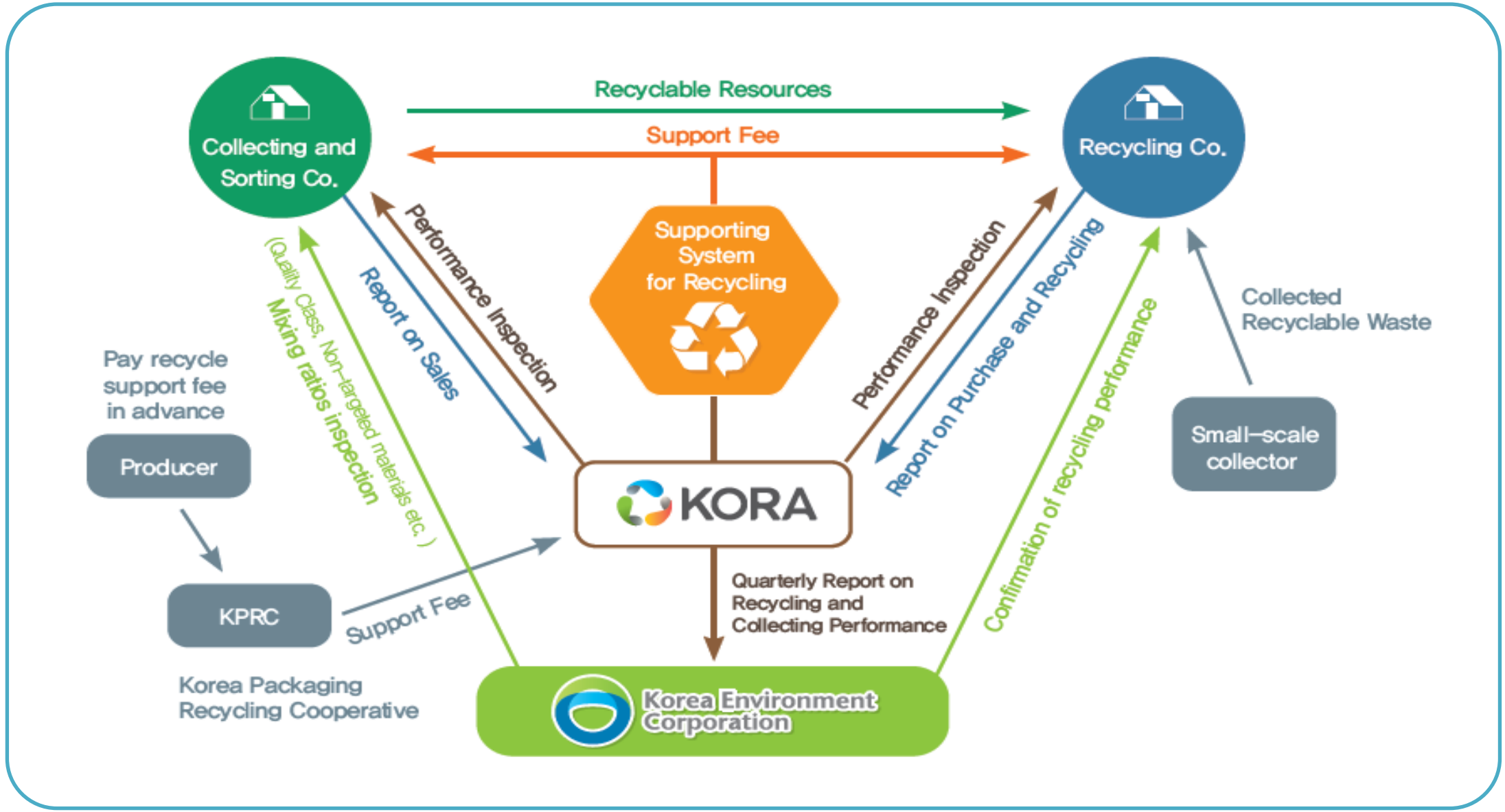
Lubricants

Fluorescent Lamps

etc…

Plastic crates, pallets, industrial films, window frames and door frames, flooring, heat insulating materials for buildings, safety nets, fishing nets, ropes, polyethylene pipes, PVC products, electricity and communication lines, replaceable water filters, etc.

# EPR Operation Management



# Ⅱ. Policy Shift for Promoting the Use of Recycled Plastic

# Advancing the UN Plastic Treaty

## ▪ Significance of UN Plastic Treaty

(Resolution) At the 5th UN Environment Assembly in Nairobi, Kenya, in March 2022,
a push for a legally binding international treaty on plastic pollution emerged

(Implication) Designation of plastic as a pollutant (target for reduction and removal)
→ Production of recycled materials and expansion of usage are key reduction strategies

## ▪ Progress of the Intergovernmental Negotiating Committee (INC)

| Classification | Opening Period & Location | Main Agenda |
|---|---|---|
| 1st Draft | November 2022, Puta del Este, Uruguay | Procedure and related matters of the INC, and the overall structure of the treaty |
| 2nd Draft | May 2023, Paris, France | Commencement of discussions on the purpose and key obligations of the treaty |
| 3rd Draft | November 2023, Nairobi, Kenya | Discussion on the objective, obligations, fulfillment measures, and other aspects based on the treaty draft |
| 4th Draft | April 2024, Ottawa, Canada | Continuous discussion on the treaty amendment and decision on inter-sessional work |
| Inter-sessional work | August 2024, Bangkok, Thailand | Discussions on differing opinions on specific matters |
| 5th Draft | November 2024, Busan, South Korea | Draft of the treaty |
| Plenipotentiary Conference | Undecided | Signing of the treaty |

# UN Plastic Treaty INC-5 Side Event

## Exhibition Booth

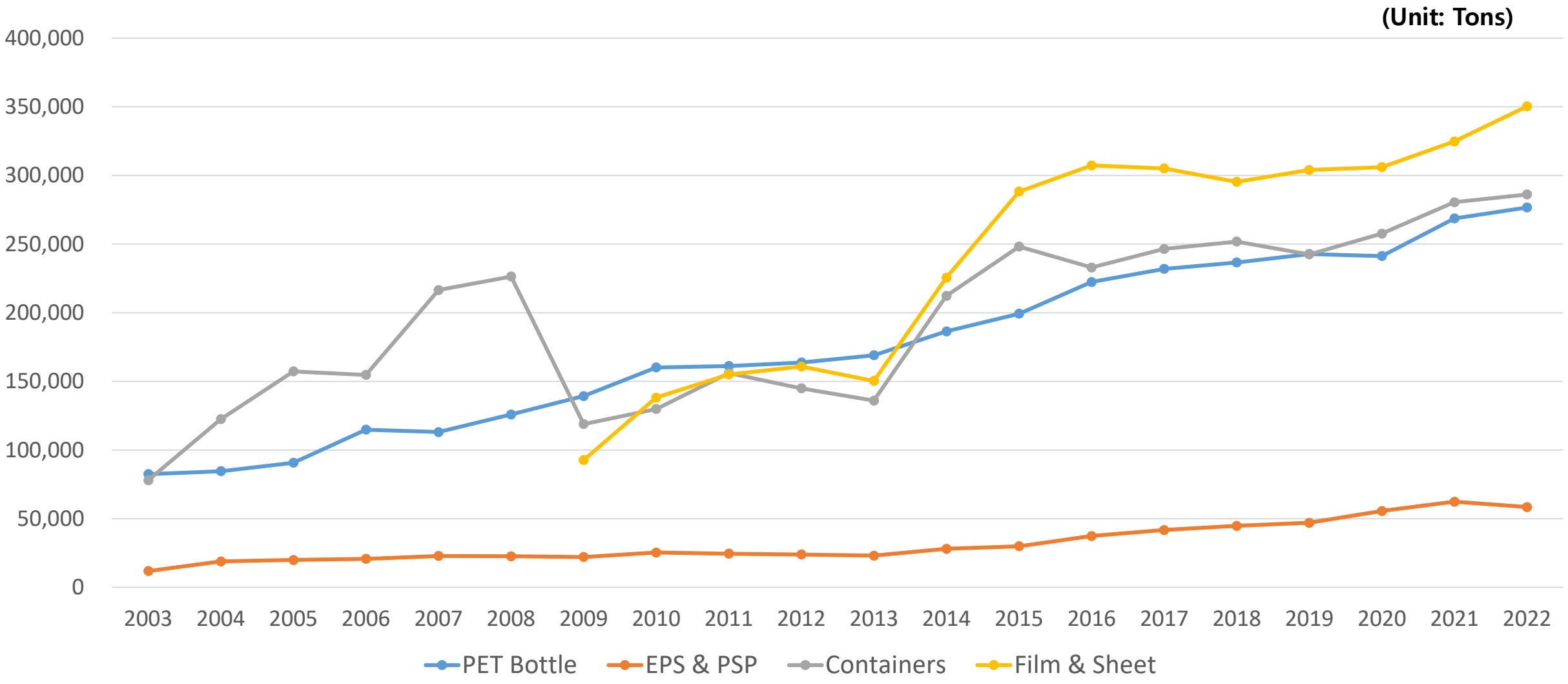
Design and operation of exhibition booths on domestic plastic EPR policies, and the comprehensive collection and recycling system for waste plastics.


## International Forum / EPR Policy Consultation

(Forum·Seminar) Conduct forums and seminars on the EPR policy and international greenhouse gas reduction

(EPR Consultation) Introduce experiences and policies related to operation of the EPR policy, and conduct tailored consultation programs for participating countries.

# Recycling Performance of Plastic Packages (2003-2022)




※ From 2009, synthetic resin film and sheet film have been separated into different categories.

Source: Korea Resource Circulation Service Agency (KORA)

# Recycling Material Usage Goals by Country

| Classification | | Content | Source |
|---|---|---|---|
| EU | | - At least 25% of the disposable PET bottles released in the market (by 2025)<br>- 30% of all disposable plastic bottles (by 2030) | Single Use Plastics Directive |
| | | - PET contact-sensitive packaging: 30% (from 2030), 50%(from 2040)<br>- Other contact-sensitive packaging from plastic material besides PET (except for disposable plastic drinking bottles): 10% (from 2030), 50% (from 2040)<br>- Disposable plastic bottles: 30% (from 2030), 65% (from 2040)<br>- Other plastic packaging: 35% (from 2030), 65% (from 2040) | Packaging and Packaging Waste Regulation |
| | | - Cobalt 16%, Lead 85%, Lithium 6%, Nickel 6% (from 2031)<br>- Cobalt 26%, Lead 85%, Lithium 12%, Nickel 15% (from 2036) | Battery Regulation |
| | | - 25% of new cars will use recycled plastic, and 30% of plastics from scrapped cars will be recycled. | Vehicle Scrapping Regulation |
| USA | California | - Plastic drinking containers 15% (from 2022), 25% (from 2025), 50% (from 2030) | AB-793 |
| | Washington | - Plastic drinking container: 15% (from 2023), 25%(from 2026), 50% (from 2031)<br>- Dairy product (milk) containers and plastic wine containers (187ml): 15% (from 2028), 25% (from 2031), 50% (from 2036)<br>- Plastic trash bags: 10% (from 2023), 15% (from 2025), 20% (from 2027)<br>- Household cleaning and personal hygiene goods: 15% (from 2025), 25% (from 2028), 50% (from 2031) | SB 5022 |
| | New Jersey | - Hard plastic containers: 35% (from 2022),<br>- Plastic drinking containers: 10% (from 2022), 25% (from 2026), 50% (from 2031)<br>- Reusable to-go bags made out of plastic film: 20% (from 2022), 40% (from 2025) | Nj S2515 |
| Korea | | - Facilitate the plastic packaging recycled material ratio to be 10% (2025), and 30% (2030) | Act on the Promotion of Saving and Recycling of Resources |

Source: (2023), Study on activating recycled material markets for a circular economy, KEI

# Recycling Material Usage Goals By Country

| Classification | Content | Source |
|---|---|---|
| Germany | - At least 25% of disposable PET drinking bottles (from 2025)<br>- At least 30% of all disposable plastic drinking bottles (from 2030) | VerpackG |
| UK | - Payment of taxes when manufacturing and importing recycled plastic less than 30% (with partial exemptions for some industries) | Plastic Tax |
| Canada | - At least 50% of recycling material to be within plastic products (by 2030)<br>- More than 55% of plastic packaging to be recycled or reused (by 2030)<br>- Collect 100% of all plastics (by 2040) | Canada's Zero Plastic Waste Action Plan |
| Australia | - Facilitate 100% of packaging to be reusable, recyclable, and composable (by 2025)<br>- Facilitate 70% of plastic packaging to be recycled or composed (by 2025)<br>- Facilitate an average of 50% of recycled materials to be used within packaging (for plastic packaging: 20%) (by 2025)<br>- Phase out unnecessary or problematic disposable plastic packaging by stages (by 2025) | National Plastics Plan 2021 |
| Japan | - 60% of container packaging will be reused or recycled (by 2030)<br>- Double the use of recycled materials (by 2030)<br>- Effectively use 100% of reused or recycled plastic (by 2035) | Resource Circulation Strategy for Plastics |
| Portugal | - At least 25% (by 2025) and 30% (by 2030) of PET bottles | The Global Commitment 2022 Progress Report |
| Norway | - Facilitate plastic packaging recycled materials ratio to be 50% (by 2025) and 55% (by 2030) | Norwegian Plastics Strategy |

# Current Status of Domestic Recycled Material Usage Expansion Policy

- **Recycling material use percentage labeling system** (Article 33-2 of the Act on the Promotion of Saving and Recycling of Resources)

(Content) A system that allows manufactures of products and containers using a certain percentage of recycled plastics made out of domestic waste plastic to mark the usage rate on their products or containers

(Implementation) Domestically produced recycled materials from waste plastic

- More than 10% of the minimum usage percentage for food PET bottles
- More than 20% of the minimum usage percentage for electrical and electronic equipment according to Article 2, No.1 of 「ACT ON RESOURCE CIRCULATION OF ELECTRICAL AND ELECTRONIC EQUIPMENT AND VEHICLES」
- More than 10% of the minimum usage percentage for other products, containers, and other items

- **Basic policies, etc. on Guidelines with which Designated Recycling Business Operators shall Comply**

(Content) Adding synthetic resins and other plastic material manufacturing industries to the list of recyclable resources by industry

(Implementation) Manufactures of synthetic resins and other plastic materials must submit production and recycling performance reports to the Korea Petrochemical Industry Association (KIPA) and the Korea Chemical Fibers Association (KCFA)

# Definition & Production Process of Plastic Recycling Materials

## Definition of Plastic Recycling Materials (Act on the Promotion of Saving and Recycling of Resources)

"Recycling Material" refers to resources that are wholly or partially made from recyclable resources, as defined by the enforcement ordinance

- Enforcement ordinance : The scope of recycled materials includes 'waste synthetic resin material products, processed packaging, and manufactured recycling materials.'

## Production Method of Plastic Recycling Materials

1. Mechanical Recycling: It is a method where disposed plastic is cleaned, crushed, and melted to create a new product
   - PET (Polyethylene Terephthalate): Commonly used in bottles and fibers; after mechanical recycling, it can become a new bottle or fiber
   - HDPE (High-Density Polyethylene): By recycling strong plastics from milk cartons, detergent bottles, and more, it is recycled into pipes or plastic boxes
   - PP (Polypropylene): Used in food containers and auto parts; through mechanical recycling, it is recycled into containers or industrial goods
2. Chemical Recycling: It is a method where plastic is chemically decomposed back into its source material

## General Forms of Plastic Recycling Materials (pallet, flake, ingot)


# Ⅲ. Production Process of Recycled Plastic Materials

# Production Process of Plastic Recycling Materials: Summary

| Recyclable Resources | Collecting & Sorting Facility | Recycling Facility | Recycled Products |
|---|---|---|---|
|  | Collection & Sorting of Unsorted Plastic (Private and Municipal Sorting Facilities) | Single Material (PE, PP, PS) | MR : pallets |
| | | Films | MR : pallets, products<br>TR : solid fuel<br>CR : recycled fuel |
| | | PET Bottle | MR : flake |
| | Expanded Plastic | Melting & Extrusion | ingot or pallet |

# Production Process of Plastic Recycling Materials – Sorting the Collected

## Disposal

Continuous recycling at designated locations


Recycling on selected dates

## Separation & Sorting Lines


# Production Process of Plastic Recycling Materials – Sorting the Collected

## Pressing Process


## Managed By Item

PET Bottle

Single Material PE, PP

Films

# Production Process of Plastic Recycling Materials – PET

Carry-in of Sorted Items

Input (Transfer)

Label Stripper

Air Blower Tumbler

1st Draft of Sorting by Color (Optical Automated Sorting)

2nd Draft of Sorting by Color (Optical Automated Sorting)


Sorting Based on Colors (Removal of Debris such as Labels)

Crushing (by Color)

# Production Process of Plastic Recycling Materials – PET

Initial Cleaning (Gravity Separation)

Storage of Cleaned Items

Cleaning (Adding NaOH)

Multiple-Stage Cleaning (High Hot Water Cleaning)

Hot/Cold Air Drying

Additional Color/Material Sorting

Material Packaging

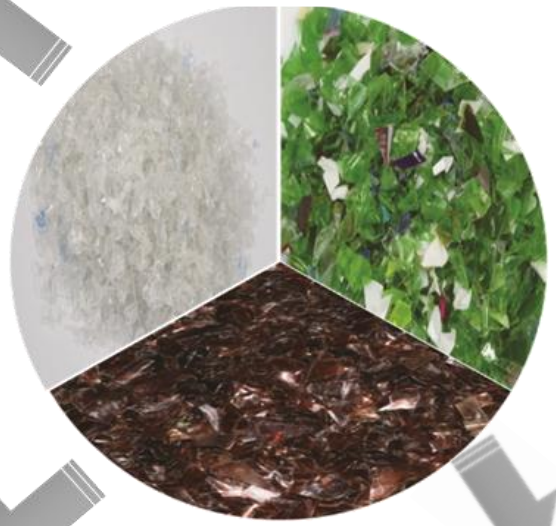
Material Shipment

# Production Process of Plastic Recycling Materials – PET

**Long Fiber**
**(for Apparel Fabric)**

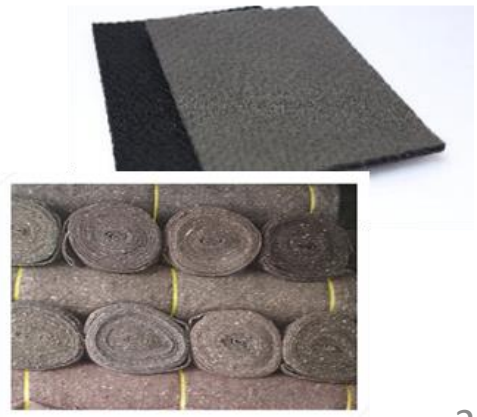

**Drinking Bottles**
**(Bottle to Bottle)**

**Recycling Material**
**(PET Cleansed Flake)**

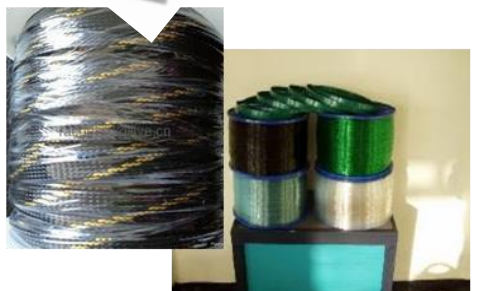


**Fiber Types**


**Non-Woven Fabric**



**Sheet Material**



**PET Wires**

# Production Process of Plastic Recycling Materials – PE, PP

Carry-in of Sorted Items

Crushing

Cleaning

Melting and Extrusion

Cooling

Cutting

Pallet Production

# Production Process of Plastic Recycling Materials – PE, PP

Plastic Boxes

Pallet

Recycling Material: Pallet

Pipe

Underground Pipes

# Production Process of Plastic Recycling Materials – Film MR

**Carry-in of Sorted Items**

**Crushing**

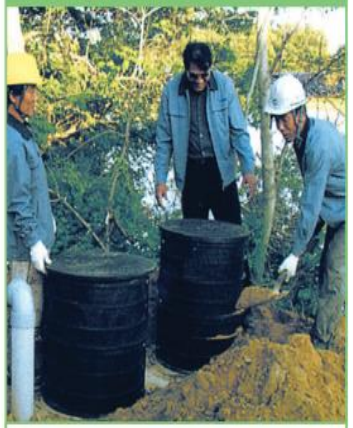
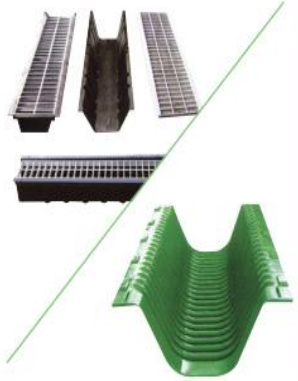
**Melting**

**Recycling Material Production**

**Melting and Molding**

**Molding Product Production**

# Production Process of Plastic Recycling Materials – Film MR

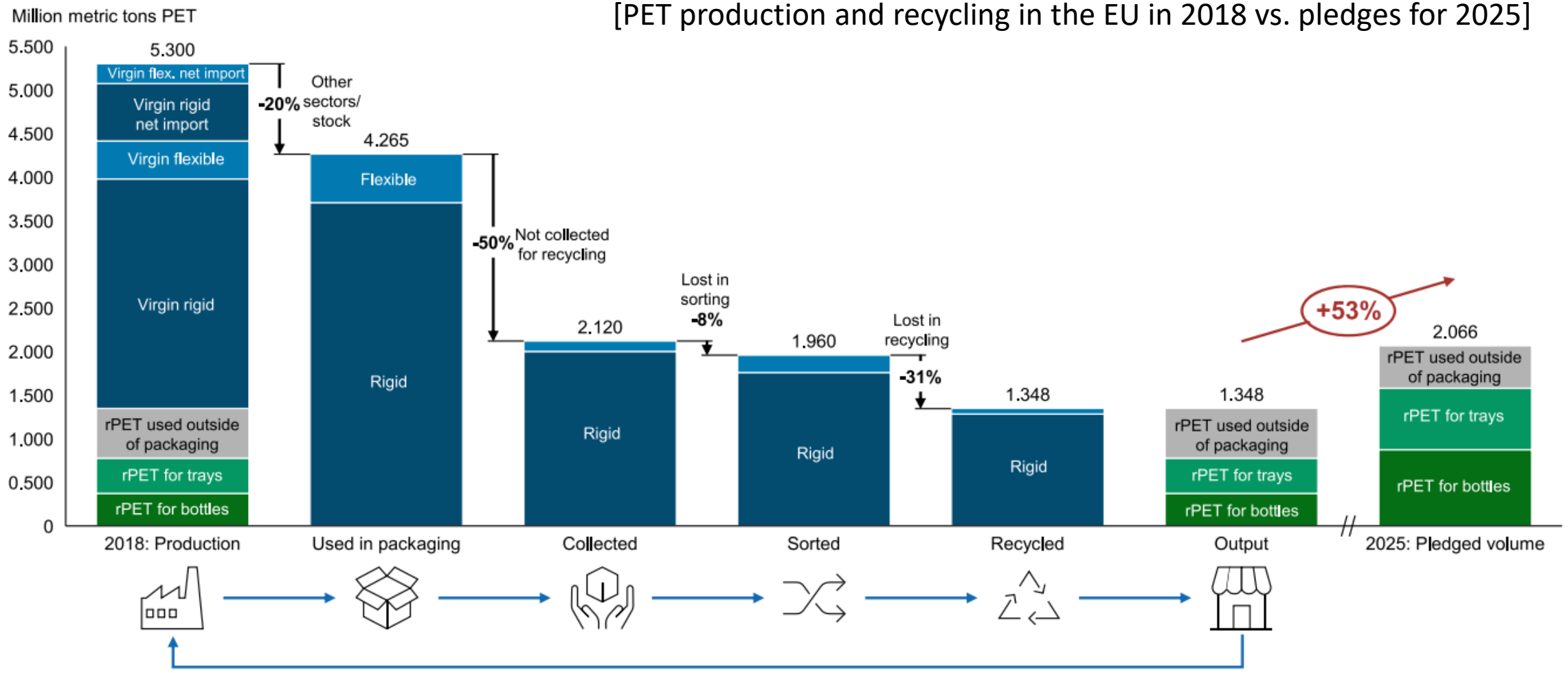
| Boundary Blocks | Fence Supporting Blocks | Parking Blocks | Pigpen Flooring | Drainage | Manhole Assisting Pipes |
|---|---|---|---|---|---|
|  |  |  |  |  |  |
|   |  |   |  |  |  |

# Ⅳ. Market Outlook and Chanllenges

# Europe Plastic Recycling Material Supply & Demand Trend - rPET

**Due to the introduction of Europe's mandatory recycling material policy, the demand for rPET is expected to increase by 53% in 2025(from 1.348 million tons (in 2018) to 2.066 million tons (in 2025))**

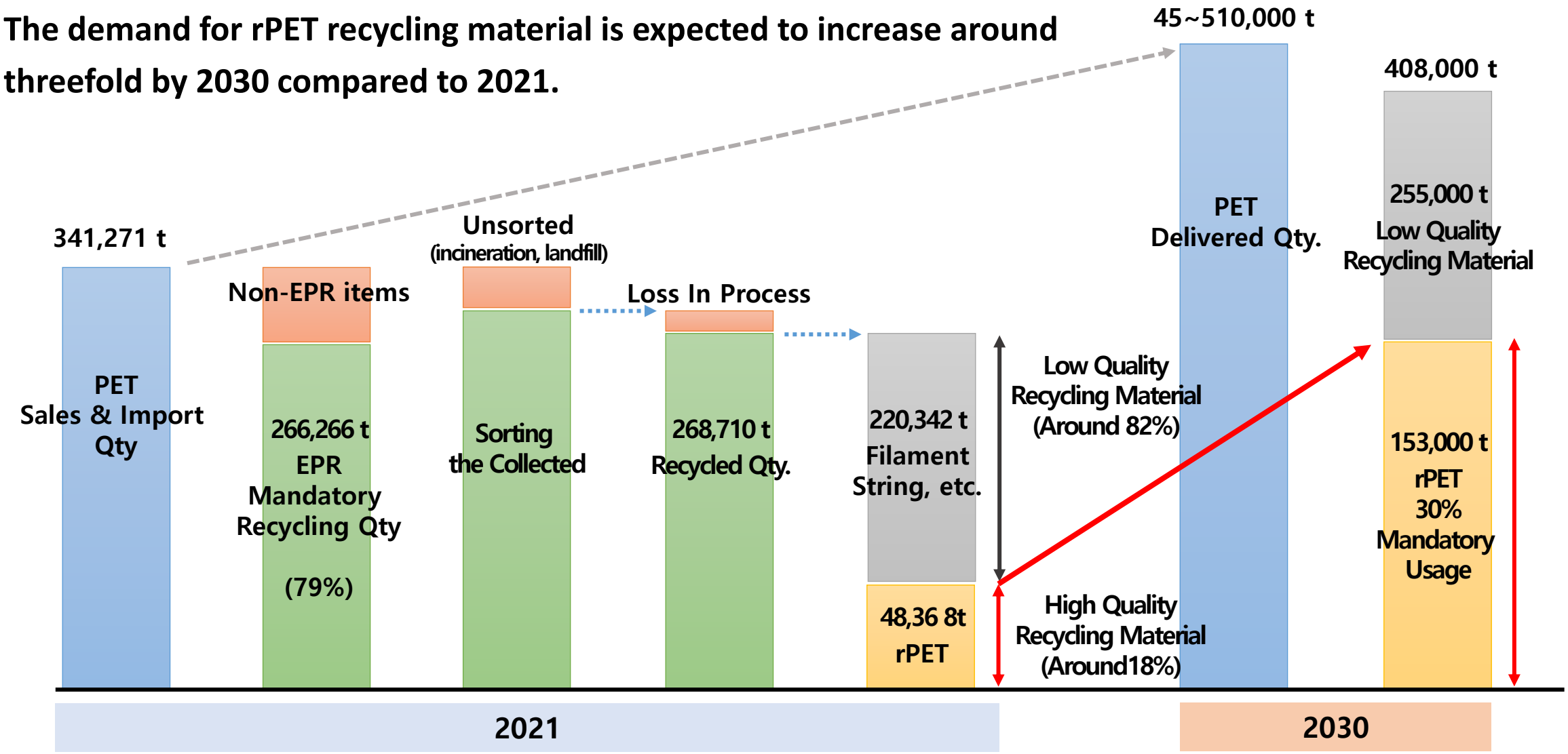
[PET production and recycling in the EU in 2018 vs. pledges for 2025]




Source: Presentation materials by Professor Jang Yong-Cheol of Chungnam National University, "2022 Extended Producer Responsibility(EPR)", 20th Anniversary Forum Report (Original Source: Kashlert et, al., 2022)

# Domestic Plastic Recycling Material Market Trend - rPET

**The demand for rPET recycling material is expected to increase around threefold by 2030 compared to 2021.**




Source: Presentation materials by Professor Jang Yong-Cheol of Chungnam National University, "2022 Extended Producer Responsibility(EPR)", 20th Anniversary Forum Report

# Business Related to Promoting Recycling Material Usage (KORA)

## Support of certification acquisition for recycling companies

- (Objective) Meeting the certification requirements of domestic and international recycling material demands and promoting high quality recycled materials
- (Main Content) Support for acquiring global certifications like GRS, ISCC+, and others, for KORA member companies
  - Fee reduction through an agreement with Control Union Korea
  - Partial support for certification fees if obtained within a certain period
- (Expectancy Effect) Response to recycling material demand through obtaining global certifications
- (Mid-to-Long-Term Plan) After reviewing business effects, the scope and level of support will be expanded

## Expansion of certified goods such as GR certification

- (Objective) Setting quality criteria for the expansion of recycled product demand in the private and municipal sectors
- (Main Content) Identifying products for certification and supporting the certification acquisition for manufacturers of products subject to the establishment or revision of quality certification standards (including test analysis, administrative procedures, etc.)
- (Expectancy Effect) Establishing recycling material and product quality criteria through existing standards and enhancing product reliability through certification acquisition
- (Mid-to-Long-Term Plan) Establishing standards for overall plastic recycling materials and enhancing certificate acquisition for member companies producing these materials and products

## Promotion of registration in the Public Procurement Service

- (Objective) Supporting recycling material and recycled product manufactures with a smooth registration process in the Public Procurement Service
- (Main Content) Supporting recycling material and recycled product manufactures with limited administrative capacity for a smooth registration process in the Public Procurement Service (manual production)
- (Expectancy Effect) Response to the demand of recycled materials through the vitalization of registration in the Public Procurement Service
- (Mid-to-Long-term Plan) After the review of manual distribution effects, additional support will be provided as needed

# Main Challenges for the Expansion of Recycling Material Usage

- **Need for quality improvement and safety of plastic recycling material**

  1. There is concern that plastic made from recycled materials is of lower quality compared to virgin plastic and 2. in certain industries, such as food packaging, stricter quality and safety requirements are needed.

- **Need for technical innovation for product development**

  Rather than simply recycling plastic, technical innovation and support are needed to produce high-value products.

- **Need for government policy and system support**

  Recycling quantities need to be increased through the introduction of policies that encourage greater use of recycled plastic materials and the expansion of eligible items under the EPR policy.

- **Expansion of recycling infrastructure and enhancement of global cooperation**

  To maximize plastic recycling and the use of plastic recycled materials, it is necessary to build recycling infrastructure in each country. Also, global cooperation and strategic planning for plastic recycling material trade are essential.



KORA
Korea Resource Circulation Service Agency

# Thank you