



Jeju Plus International Environment Forum 2024

The Current Status and the Future of Advanced Plastic Recycling Industry



How to activate the plastic MR industry?

September 2024 Dowon Co., Ltd.

Sung Bae Kim, CEO & Representative



❖ Company status : 35K tons of rPlastic* production, 70 employees, \$5 million export, \$30 million revenue



Dowon Factory 1	
Location	Located in Pyeongtaek-si, Gyeonggi-do
What we do	Recycle Platform Business
Products	1. sorting and categorizing waste plastic by material 2. research on waste plastic recovery technology 3. participate in industry-academia projects
Capacity	5,000 MT/year

Dowon Factory 2	
Location	Jincheon-gun, Chungcheongbuk-do
What we do	Compounding (Extrusion / Coloring / Resin R&D)
Products	- Olefin, Styrene, Alloy, Engineering series, etc. - Xanadu Own Brand Products by Resin
Capacity	15,000 MT/year

Dowon Factory 3 (sister company)	
Location	Located in Jinju, Gyeongsangnam-do
What we do	Compounding (Extrusion, Coloring, Resin R&D)
Products	Specializing in the Olefin family
Capacity	15,000 MT/year

*rPlastic; recycled plastic resin

❖ **Business Initiatives: Plastic Recycling and ESG (ESG Cooperation for Manufacturers)**



*PIR; Post Industrial Recycled

*PCR; Post Consumer Recycled

❖ Major customers (rPlastic* using manufactures)

Domestic
Large
enterprises



Global
Manufacturer



❖ Global Environmental/Technical Certifications Achieved

Global & UN Certification for recycling



- A certification created to ensure consistency and transparency in the use of recycled materials, tracking the recycling process, prevention of global warming, and environmental conservation.



- Certification that verifies the use of recyclable materials and the inclusion of RoHS prohibited substances



- Permission to supply relief supplies to each organization included in the UN (UNICEF, UNPD, UNOPS, WHO, etc.)

Expectations

- Entering specialty markets outside of traditional sources of supply, domestically and internationally
- Increase company credibility with certified issuance from a recognized authority
- Increased regulatory response, simplified by certification
- Marketing with certification

Authenticating new registrations



- **G R S , R C S**
- Certificate issued



- **U N G M**
- UNGM Vendor Basic Level Registration Completed (No.

MY UNGM ACCOUNT



- **E C V**
- Approval in progress

❖ Problems caused by production, use and disposal of plastic

<Resources depletion>



300 million barrels/year of oil consumed (for plastic production)

<Causing Climate Change>



8.5 billion tons/year of CO2 (2019) → 2.8 G ton (2050)

<Microplastic pollution>



8 million tons/year of ocean flows

<Soil/Water Pollution>



Takes 20 to 500 years to decompose

❖ Trends in EPR-based manufacturer's environmental, social, and political responsibility: Since 2015

<p>ESG</p> <ul style="list-style-type: none"> • Car manufacturer's expanded environmental, social, and governance obligations 	<p>SDGs</p> <ul style="list-style-type: none"> • Sustainable Development Goals (8,9, 12~15) 	<p>RE100</p> <ul style="list-style-type: none"> • Must use renewable energy for 100% of the energy required to produce products 	<p>CBAM / Battery passporting</p> <ul style="list-style-type: none"> • Mandatory use of recycled materials in battery production • Legislation expected in 2028 	<p>CAFE Regulations</p> <ul style="list-style-type: none"> • Average carbon emission regimes by car brand • Expanding EV adoption 	<p>IRA</p> <ul style="list-style-type: none"> • Country of origin regulations for manufacturing raw materials
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❖ Global Regulatory Status and Impact on Plastics

Key Regulations	Overview	Entry	Relevance	Domestic impact	Response difficulty
Packaging and Packaging Waste Directive (PPWD)	Recycling obligations. 2025: 65% of packaging materials, 50% of packaging plastics	2025	●	◐	●
Plastic tax	Any company producing plastic products	2023.1	●	●	◐
WEEE & ELV	Mandate the use of recycled materials	Revised 2013.	●	●	◐
Carbon Border Adjustment Mechanism (CBAM)	For key industrial materials such as steel, aluminum, cement, power, plastics, etc.	October 2023. 2026. Customs duties	●	◐	●
Sustainability Disclosure Guidelines (CSRD)	Companies with revenues over €150 million. Obligation to consider the environmental impact	January 2023. Phased in from '24	●	◐	●
Ecodesign regulations (ESPR)	Minimize the environmental and social impact of plastic products throughout their life cycle	In 2023	◐	◐	◐
New battery regulations	Mobility, EVs, e-bikes, industrial batteries > 2 kWh (in plastic)	H1 2023	◐	◐	●
Classification and Packaging of Chemicals (CLP)	Restrict chemicals and ensure product safety	H1 2023	●	◐	●
REACH & RoHS	Registration, Evaluation, Authorisation and Restriction of Chemicals / Restriction of Hazardous Substances	2023.1	●	◐	◐

Sources: EU Commission website, Korean trade associations, etc.



❖ Mandatory recycled plastic usage by country



- **EU:** 25% plastic packaging in 2025, 30% in 2030.
- **Germany:** 50% of packaging in 2022. 77% of PET bottles in 2025



- **U.S.:** 50% plastic bottles in California by 2030
- **Canada:** 50% of packaging in 2021, 100% in 2025

❖ Plastics Tax Progress: Taxing certain plastic products/packaging

European Union: Imposes contribution (800 euros/ton) on unrecycled plastic packaging from 2021 → Urges member states to meet recycling targets

Member state correspondence



1. United Kingdom: April 2022. Imposing a tax of approximately \$270 per ton on plastic packaging with less than 30% recycled content.

•**Impact:** Companies are changing packaging design to increase recycled plastic content and investing in recycled plastic



2. Italy: To be fully implemented in 2024. Imposes a 450 euro/ton tax on non-recycled plastic packaging

•**Impact:** Companies are changing their design and material choices to make packaging more recyclable



3. Spain: January 2023. Tax of 450 euros per ton on non-recycled plastic packaging.

•**Impact:** Estimated tax revenue increase of around €700 million per year. Companies work harder to make plastic packaging more recyclable.



4. Belgium: Scheduled to apply after 2024. Considering a similar system in its own country.



5. France: France is currently considering introducing a plastic tax, which would impose a cost on unrecycled plastic packaging



6. Germany: considering introducing its own plastics tax, and considering additional domestic measures based on EU regulations

Enforced

Preparing

Enterprise response

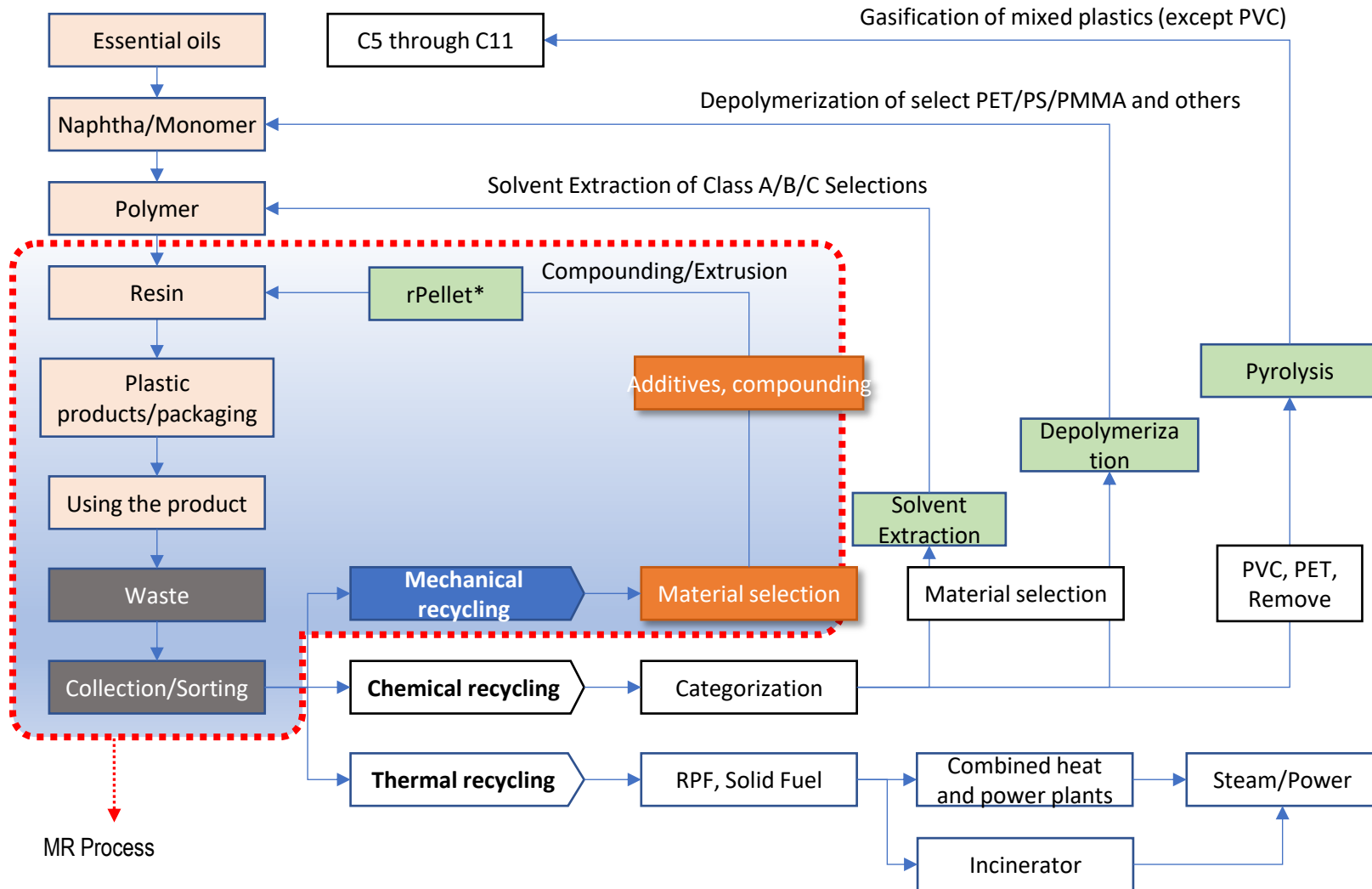
Increase the use of recycled plastics

Packaging design/redesign

Switch to recyclable packaging

Improve your supply chain

❖ Plastics Recycling Technology Map and Mechanical Recycling (MR) Process



*rPellet; recycled plastic resin

❖ The state of the domestic plastic recycling industry

1. domestic plastic recycling rate

- **Overall recycling rate:** Approximately **26%** of **waste plastics recycled (MR)** as of 2022. (32% in the EU, 9% globally)
- **PET recycling rate:** approximately 82% (among the highest in the world)

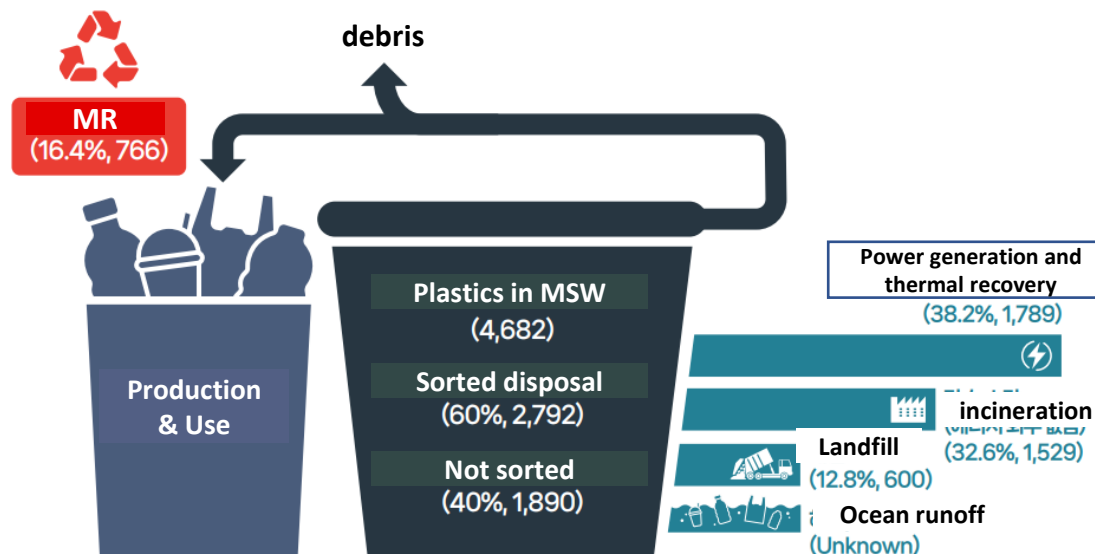
2. key trends in the recycling industry

- **Technological advances:** Investments in mechanical and chemical recycling technologies are also increasing. Commercialization of advanced recycling technologies, especially pyrolysis (emulsification, gasification, and depolymerization).
- **Policy support:** Promoting recycling rates through the Resource Recycling Promotion Act, the Resource Circulation Act, and various recycling policies. We also have various programs to reduce plastic use and promote recycling through our "circular economy" strategy.

3. **Economic value:** South Korea's **plastic recycling industry is worth about KRW 5 trillion** and is expected to continue to grow.

4. key challenges

Recycling infrastructure Improvements	Need for effective recycling infrastructure to address source diversity
Empowering consumer collaboration	Separate recycling requires additional education and campaigns
Improve recycled product quality	Need to improve quality of products using r-Plastic, technology development



<Status of Waste Plastic Recycling in Korea, Greenpeace 2022>

❖ Onsite Challenges of Mechanical Recycling (MR) of Plastics


✓ Recyclers' side

- Technology limitations of plastic sorting
- Difficulty to achieving physical properties
- Unstable supply of waste plastics
- Lack of understanding of the properties of rPlastic (odors, debris, etc.)
- High raw material procurement prices

✓ Product manufacturers' side

- Unbalanced quality of recycled materials:
- Unstable supply of renewable raw materials:
- Affordability (price) of renewable materials
- Regulatory and certification issues:

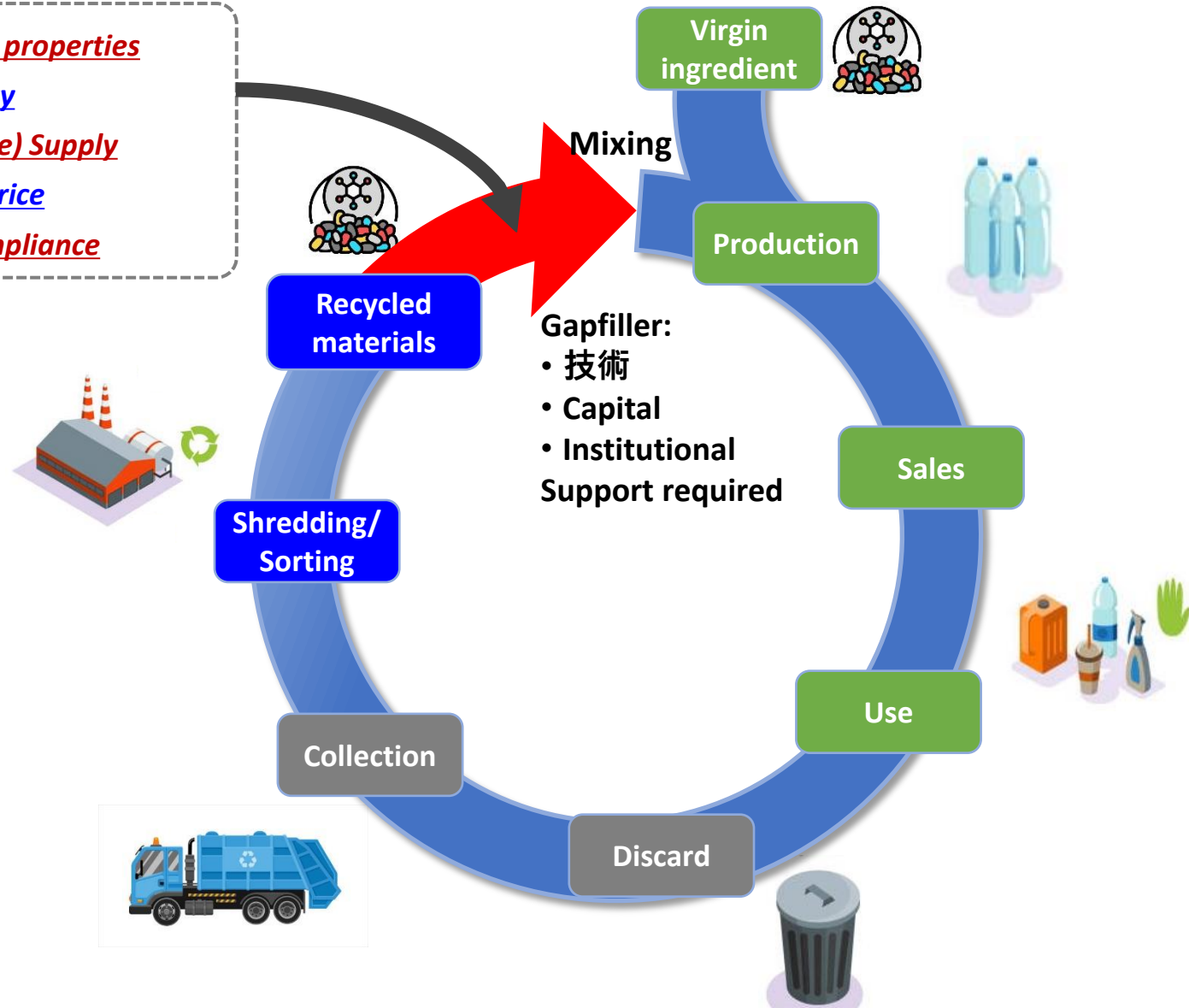


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- Policy support
 - Support for using renewable materials
 - R&D support (Compounding etc.)
 - Raw material collection/preprocessing infrastructure
 - Need for collaboration between MR-CR-TR companies

**Workaround
(How to solve)**

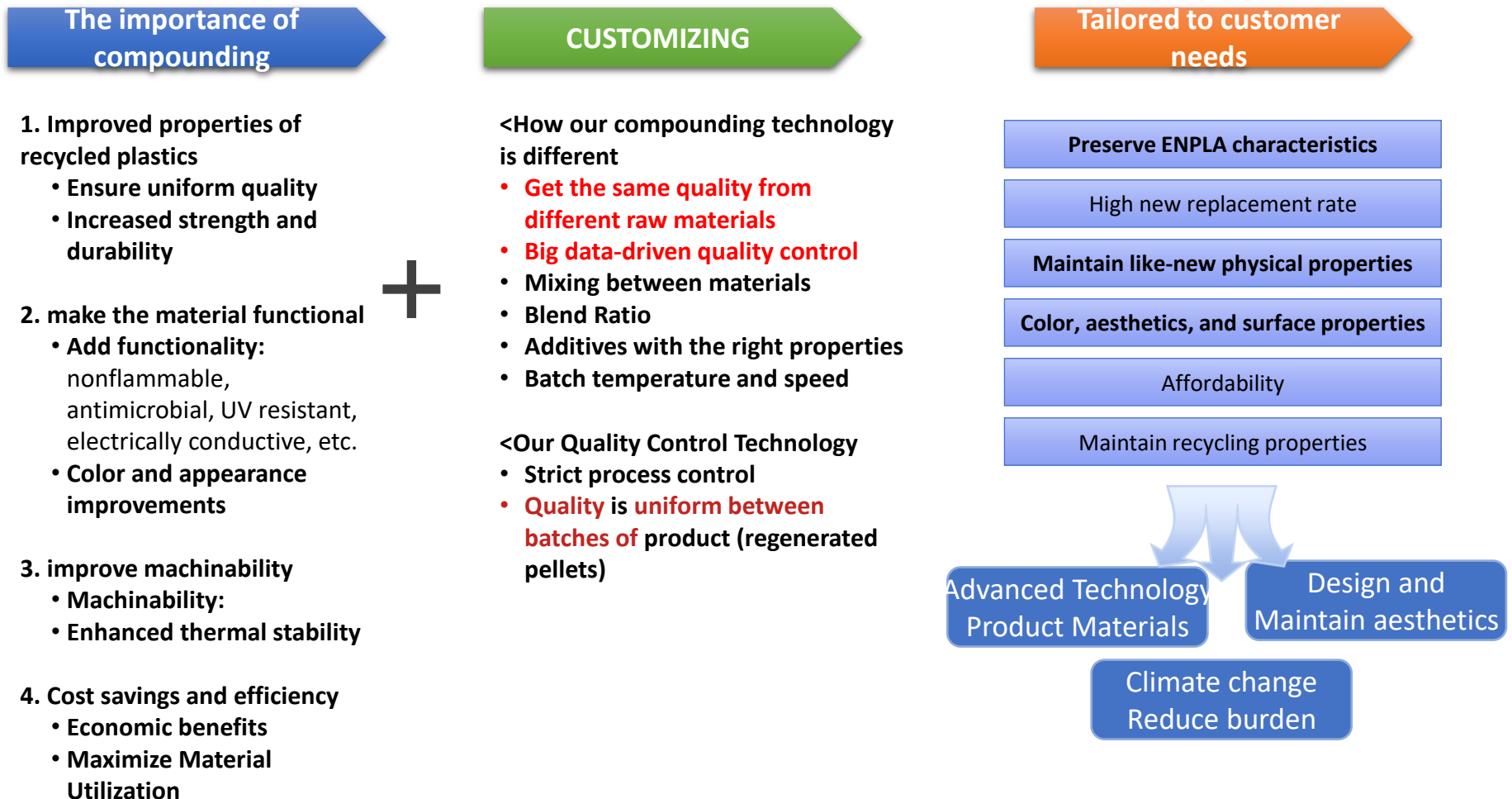
❖ Gap Fillers to Encourage the Use of Recycled Plastics

- Securing rPellet's properties
- Quality uniformity
- Continuous(Stable) Supply
- The reasonable price
- REACH/RoHS compliance



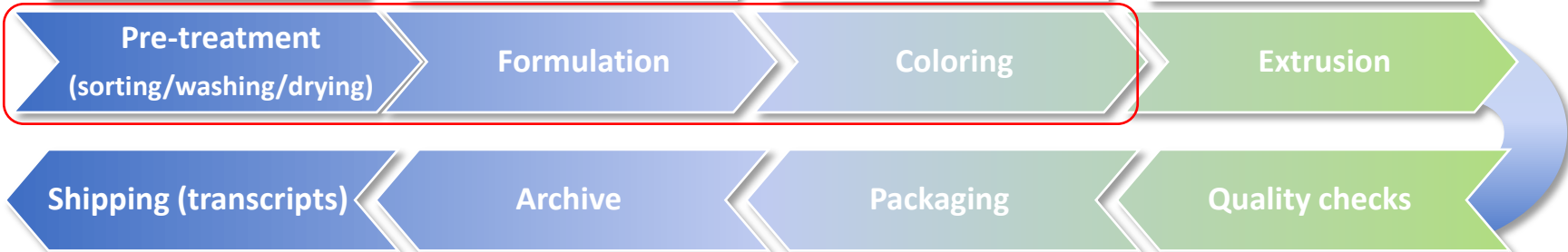
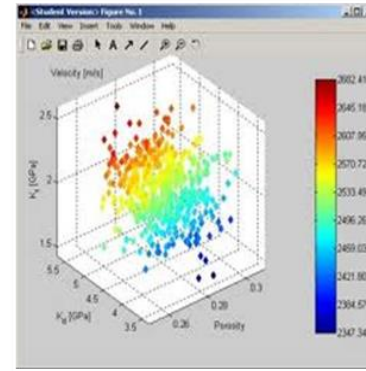
❖ Technical solutions: The importance of compounding and our technology (customization)

✓ **Compounding is the process of mixing waste plastic raw materials with various additives to improve the performance of recycled plastic materials.**

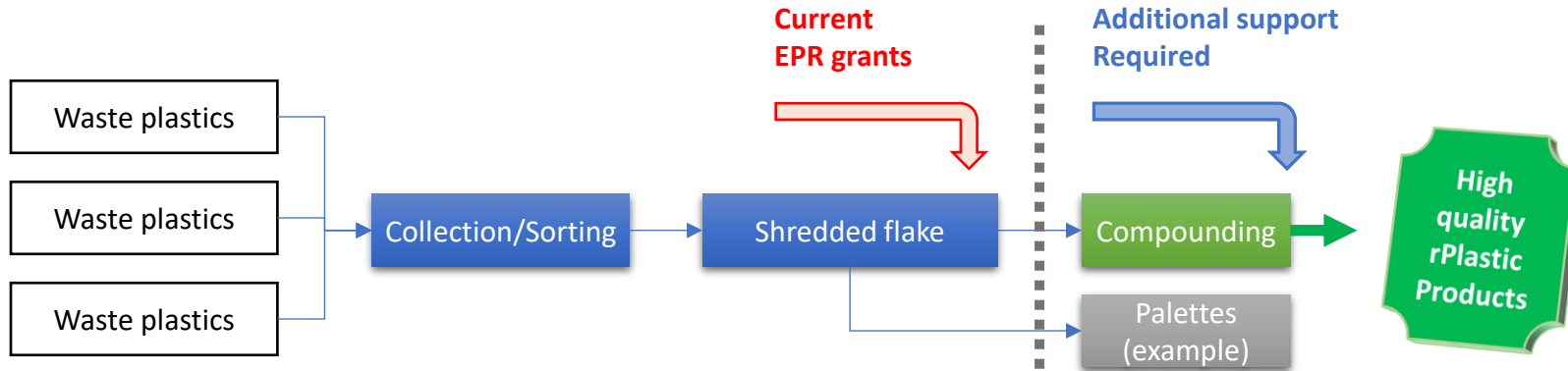


❖ Technical solutions: The importance of compounding and our technology (customization)

✓ Waste plastic collection → Pretreatment (sorting/washing/drying) → Compounding → Extrusion → rPellet

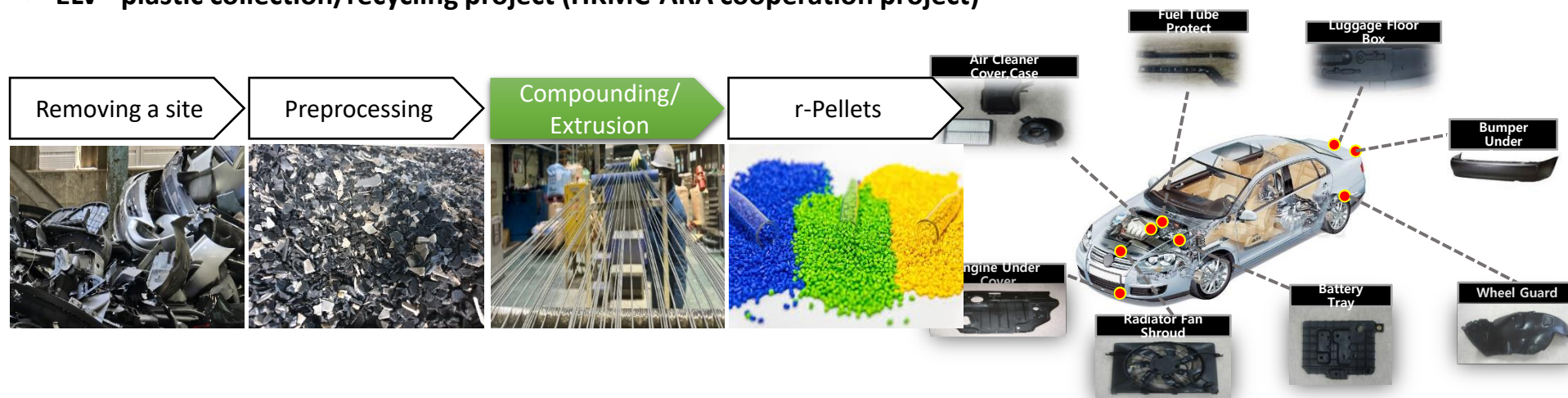


❖ Policy Support 1: Expand EPR subsidy support (scope)



❖ Policy support 2: Support for collection schemes (from manufacturer, case study)

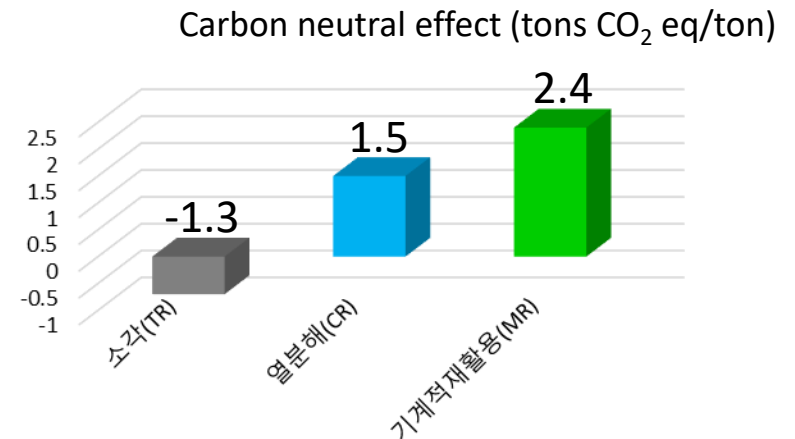
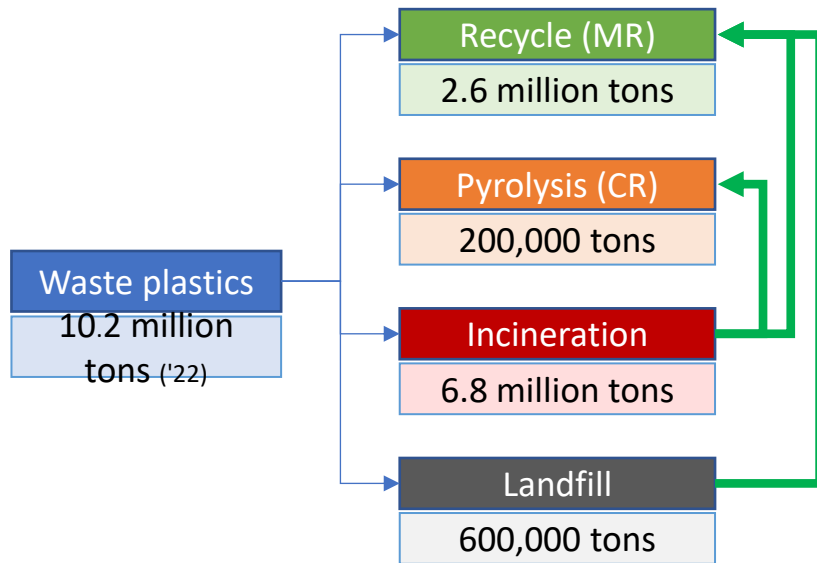
✓ ELV* plastic collection/recycling project (HKMC-ARA cooperation project)



*ELV; End-of-life Vehicles

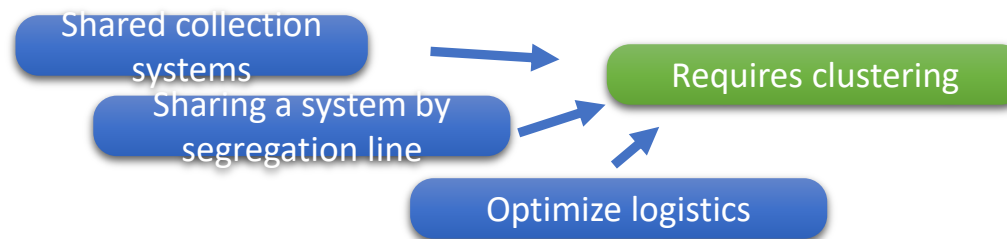
❖ Policy support 3: Need for collaboration and re-balancing between heterogeneous recycling

- ✓ Increase the proportion of MR and CR with high net-zero impact and reduce reliance on incineration (TR) and landfill
- ✓ Need for policy coordination among disparate recyclers



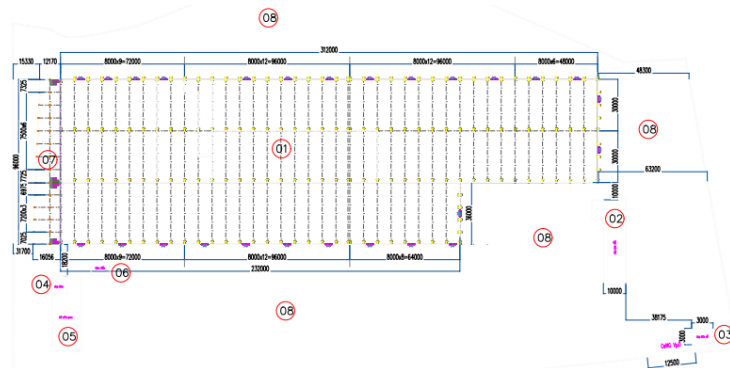
- The GHG reduction effect of mechanical recycling (MR 2.4) of PET is greater than that of chemical recycling (CR, 1.5) and heat recovery (TR, -1.3) (Source: Samil PwC)

- ✓ The need for clustering



❖ Building a Global Plastics Recycling Value Chain: Expanding Overseas Plastic Recycling Businesses

- ✓ **Promoting the construction of a recycled plastics plant in Vietnam**
 - Near Hanoi, Vietnam
 - (Establish a JVC with a local logistics provider)
 - 50 tons/day → Scale up to 500 tons/day production



- ✓ **Participation in Vietnam's Resource Recycling Industrial Park**
 - Memorandum of Understanding between the Korean and Vietnamese Ministers of Environment
 - 220Ha land near Hanoi, Vietnam
 - Circular Economy
 - Handling domestic manufacturers with local presence (by-products, confidential waste)
 - Local environmental companies
 - Integrated management, R&D, and monitoring

<RRIZ 5대 주요 구성>



❖ Business expectations and end goals

