한국건축재재활용사업공제조합
KOREA CONSTRUCTION MATERIALS RECYCLING COOPERATIVE

Establishing a Circular Economy System for Building Materials

2024.9.27

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Introduction of the Cooperative

KOREA CONSTRUCTION MATERIALS RECYCLING COOPERATIVE

○ Korea's only recycling business cooperative that unifies and manages producers and recyclers for construction products

■ Founding grounds

○ A statutory corporation under Article 27 of the Act on the Promotion of Saving and Recycling of Resources

○ Recycling cooperative for the operation of the Extended Producer Responsibility(EPR) for construction products

■ Purpose

○ To contribute to the realization of a resource-circulating society and carbon neutrality goal by performing and supporting tasks aimed at improving resource circularity and expanding the recycling of construction products

○ To carry out recovery and recycling support projects for producers obligated to recycle construction products

Introduction of the Cooperative

■ Membership status : A total of 254 members (as of 2024.8.31.)

Category	Flooring Materials	Window Profiles	PVC Products	Total
Producers	31	39	100	170
Recycling Company	13	38	33	84

※ All businesses involved in the manufacturing, importing, and recycling of construction products are eligible for membership.

■ Key Projects

○ Recycling deduction program for producers with recycling obligations

※ Applicable Products: Flooring materials, window profiles, and PVC products

○ Research, surveys, technology development, and support to expand the recycling of construction products

○ Educational and promotional initiatives related to resource circulation for construction products

Characteristics of Plastic Building Materials

■ Characteristics of Products

○ Flooring Materials

- A representative interior material, evolved into high-performance products with various functions such as lightweight and impact reduction
- Divided into sheet (residential, ondol floor) and floor tile (commercial, non-ondol floor)
- Durable products that are replaced after moving and reconstruction (usually used for 7 to 20 years)

○ Window profile (window sash)

- A representative window frame material for residential buildings with outstanding insulation, sound insulation, weather resistance, etc.
- Products that can be used for the entire lifespan of a building (20~40 years of use considering reconstruction)

○ PVC Pipes

- for water supply and sewerage, wire and cable protection, and agricultural waterways (Long-term use of 50+ years or more)

Characteristics of Plastic Building Materials

■ Characteristics of Resource Circulation

○ Building materials have a long lifespan and can be used for a long period of time, reducing waste generation.

※ For window profiles, the waste generation rate is 18.3% of the product output, according to 2017 research results.

○ Excellent Material Recycling

- Material recycling: Recycling through physical processing without changing physical properties

- Infinite recycling of resources through closed-loop recycling

※ However, thermal and chemical recycling is challenging due to the PVC material.

<Closed-loop recycling>

Characteristics of Plastic Building Materials

■ Domestic Recycling

○ Building materials waste is highly valuable so proactively recovered and recycled by the private sector

○ Product-specific recovery and recycling processes

- Flooring Materials

Waste product collection → Primary crushing → Mixing or blending → Melting and rolling → Cooling and secondary crushing

- Window/door Profiles

Waste product collection → Primary contaminant removal and crushing → Secondary contaminant removal → Optical color sorting → Secondary crushing

- PVC Pipes

Waste product collection → Primary contaminant removal and crushing → Secondary crushing

Recycled Materials (R-PVC)

※ Application of automatic sorting system at recycling sites

Characteristics of Plastic Building Materials

■ Overseas Recycling

○ Neidhardt Recycling GmbH (Germany)

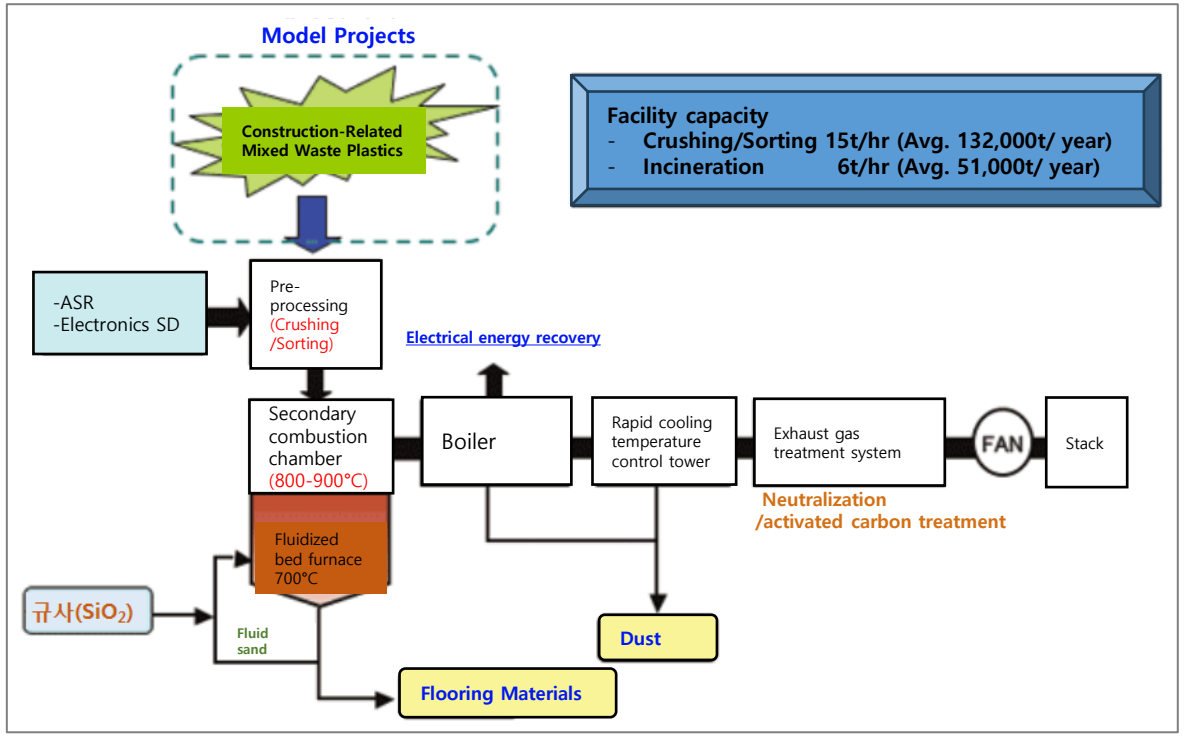
- Blister packaging using PVC-aluminum composite materials can be sorted and recycled. The sorted PVC is supplied as raw material for PVC pipes and other products.

○ R-Inversatech (Europe)

- Using high-speed impact technology developed in Japan, PVC and fibers are separated from composite waste materials such as tarpaulins. The recycled PVC material is then used in various flexible PVC products.

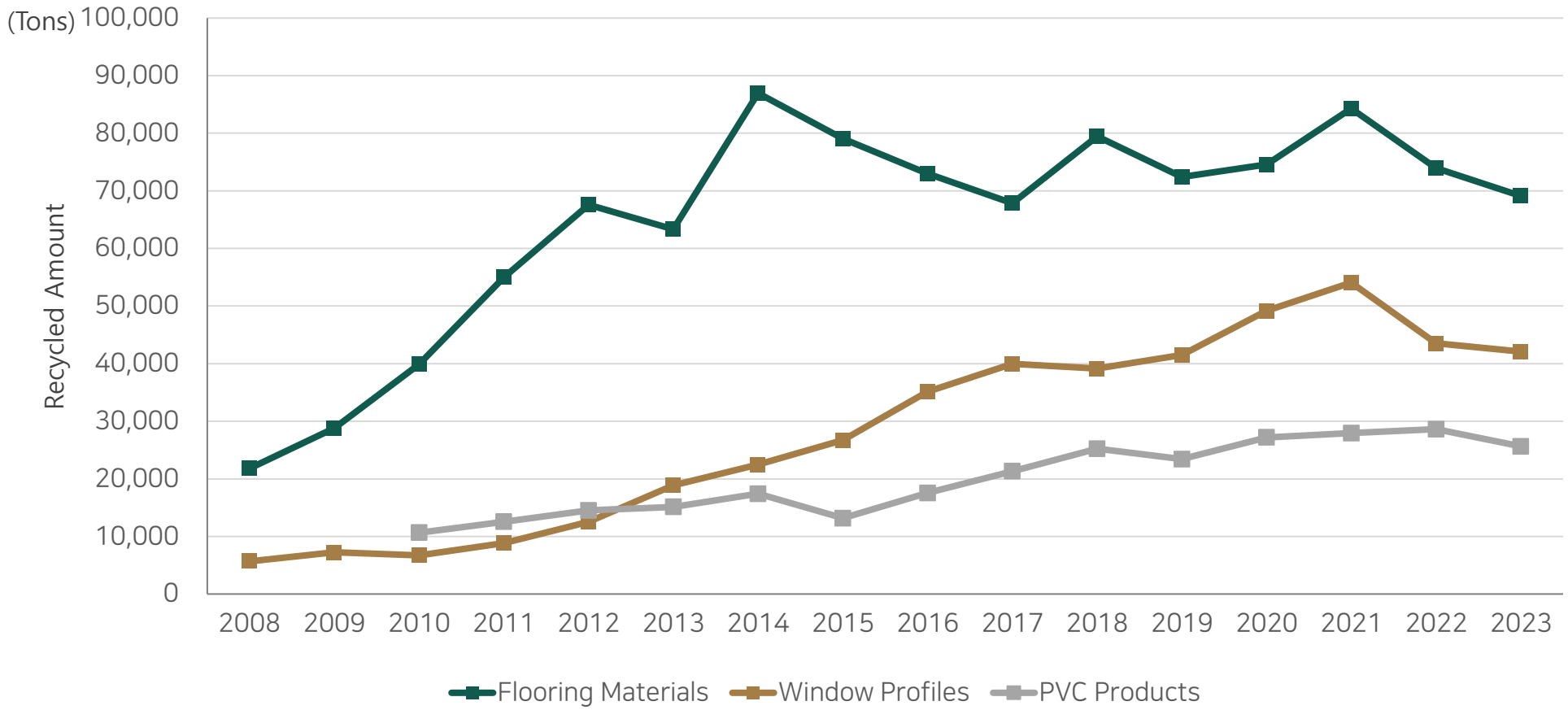
○ PVC Vinyl Environmental Council (VEC) (Japan)

- In collaboration with Kanto Construction Waste Cooperative and DOWA Eco-System Co., Ltd., we have successfully operated a long-term thermal recycling process for mixed waste, including PVC products.



<Thermal Recycling Process for Construction-Related Mixed Plastics>

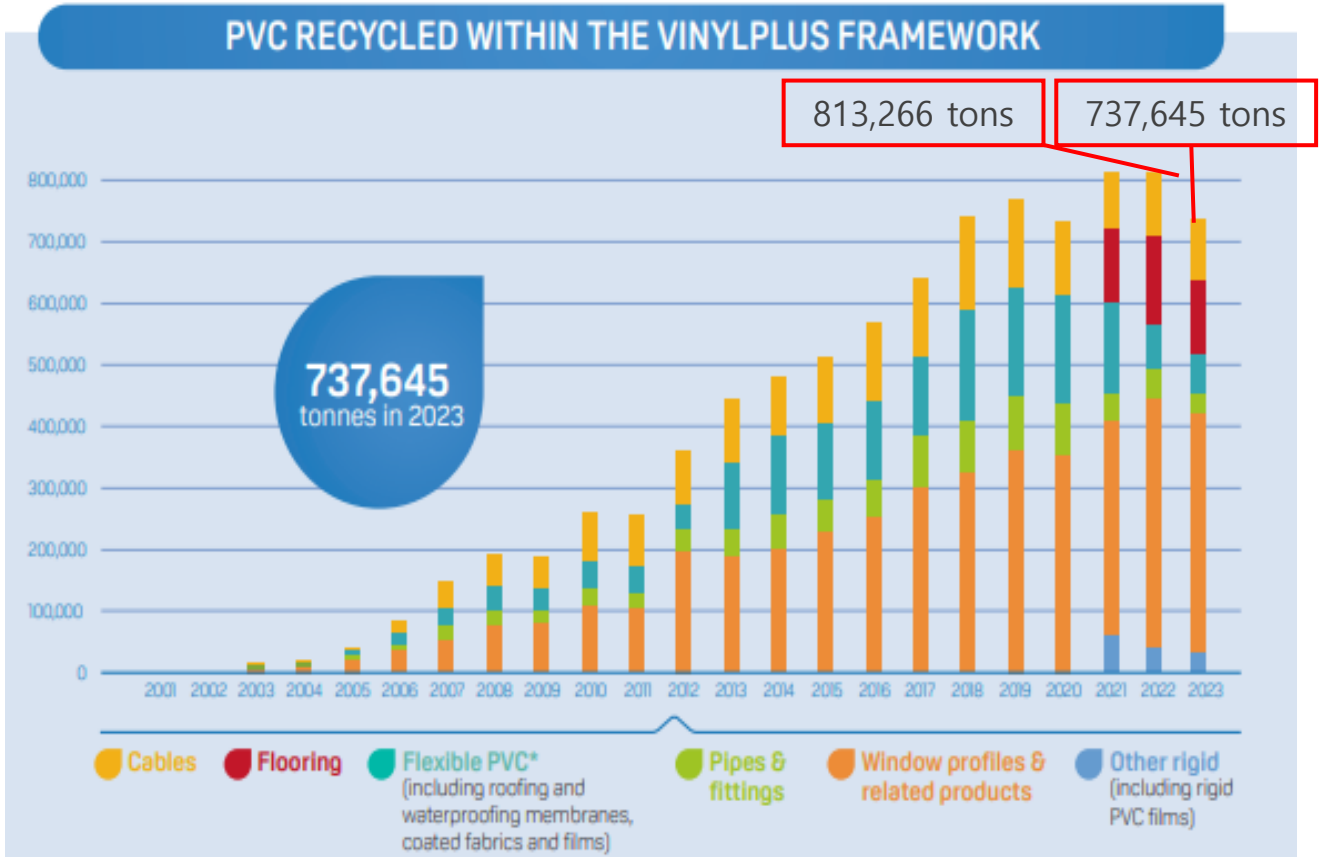
Recycling Status_ Domestic



※ 60.3% of flooring waste is recovered and recycled (as of 2023)

※ Building material waste is actively recovered and recycled, but there is a recent trend toward tightening regulations on hazardous substance standards.

Recycling Status_ Overseas



Source : Vinyl Plus

○ Goals of Vinyl Plus (~2030)

- Developing safe and sustainable recycling technologies for additives to expand the circularity of PVC value chains
- Developing responsible supplier standards and programs for carbon neutrality
- Building of global association for SDGs

○ PVC recycled : 813,266 tons('22) →737,645 tons('23)

Total reduction of 75,621 tons

※ Reasons for reduction : Continued price competition for emerging raw materials including imported products, Economic slowdown in building and construction sectors, Impact of European regulations on existing additives (Especially, the flooring and pipe sectors saw continued decline)

○ Recycled levels by product(as of 2023)

Windows/doors > Flooring materials > Wires > Flexible PVC products > Pipes > Other rigid products

Systems to Encourage Recycling

■ Extended Producer Responsibility (EPR)

○ Grounds : Article 16 of the Act on the promotion of saving and recycling of resources (Obligations of manufacturers to recycle)

○ Key contents

- A system that enables recycling by imposing a certain amount of recycling obligation on manufacturers, importers, and distributors of products and packaging materials that they produce
- Korea has run the program since 2003, focusing on packaging materials and expanding to building materials in 2023.
- Globally, it's being extended to Europe, South America (including Australia, Brazil, and Peru), and Asia.

■ A System of Mandatory Recycling Quantity Reduction

○ Grounds : Article 23 of Enforcement decree of the Act on the promotion of saving and recycling of resources (Mandatory Recycling Quantity by Producers Obligated to Recycle)

○ Key contents : Lowering the recycling obligation for producers who use recycled materials from waste plastics in their products, imports, or sales.

○ Purpose : To encourage the use of recycled materials by reducing recycling obligations for products under the EPR system when recycled materials are used in production

○ Building materials : Reduction of 5,229 tons of flooring materials, 1,081 tons of window/door profiles, and 716 tons of PVC products (as of 2023)

Systems to Encourage Recycling

■ Good Recycled(GR) Mark

○ Grounds : Article 33 of the Act on the promotion of saving and recycling of resources (Specifications and Quality Standards of Recycled Products)

○ Key Contents : A government-certified mark that ensures quality and eco-friendliness of recycled products, addressing consumer distrust and fostering confidence in the products

○ The certification standard for building material products requires the use of at least 60% recycled materials by weight, but due to the low volume of waste generated, the certification standard is relatively high.

○ Of the 403 products that have obtained the GR mark, none are building materials.

Systems to Encourage Recycling

■ Indication of Percentage of Use of Recycled Raw Materials

○ Grounds : Article 33-2 of the Act on the promotion of saving and recycling of resources (Indication of Percentage of Use of Recycled Raw Materials)

○ Key Content : Products containing more than a certain percentage of recycled materials are labeled with the percentage of the materials used.

○ Minimum percentage for building materials: 10.0%

○ Implemented since 2023, no case of building materials yet

■ GRS (Global Recycled Standard)

○ A certification standard to prove that recycled materials are used in the production of products

○ At least 20% of recycled materials must be used, and if over 50% is used, the certification logo can be displayed.

○ Certification organization : Control Union, Netherlands

■ ISCC PLUS (Internation Sustainability & Carbon Certification PLUS)

○ A certification system through which sustainability for bio- and circular economy can be proved.

○ Granted to products that used eco-friendly raw materials throughout the entire production process

○ No minimum content standard

○ Certification organization : Control Union, Netherlands

○ Certified Companies: Kumho Petrochemical, NOX, LX Hausys

Systems to Encourage Recycling

■ C2C (Cradle to Cradle)

○ The concept that a product, once manufactured and used, is not sent to waste treatment but is repurposed or valued in a new product or use.

○ Labeled with a rating based on the sustainability evaluation of the product's lifespan

○ Certification Organization : C2CPII (Cradle to Cradle Products Innovation Institute), USA

○ Certified Companies : LX Hausys, Shinmyeong Flooring, SK Chemicals

■ ZWTL (Zero Waste To Landfill)

○ A certification system that rates companies based on their waste recycling rates to shift perceptions from energy-intensive methods like incineration to environmentally responsible and innovative practices such as reuse, recycling, and decomposition.

○ Evaluates the extent of waste recycling in the workplace

○ Certification Organization : UL (Underwriters Laboratories), USA

Examples of Recycling Materials Usage

■ Domestic EPR Operations

○ EPR has been implemented since 2023 for building materials to expand recycling demand by supporting the purchase and sale of recycled materials and identifying new recycling opportunities.

○ Recycling volumes as of 2023: 69,100 tons of flooring, 42,081 tons of window/door profiles, and 25,642 tons of PVC products

■ Flooring Materials

○ Tarkett (France)

- Runs the ReStart Program to manufacture recycled products using recovered waste flooring.
- Operates its own recycling centers at eight locations across its production bases in Europe.
- Manages 98 types of eco-designed recycled products, of which carpet tiles and flooring have obtained C2C certification.

○ Shaw (U.S. flooring materials company)

- Operates the RE[TURN] program, a take-back initiative that collects waste flooring.
- Runs recycling centers, mainly in Georgia.
- Manages two types of recycled carpet tile products and many other recycled products, with approximately 90% of these products receiving C2C certification.

Examples of Recycling Materials Usage

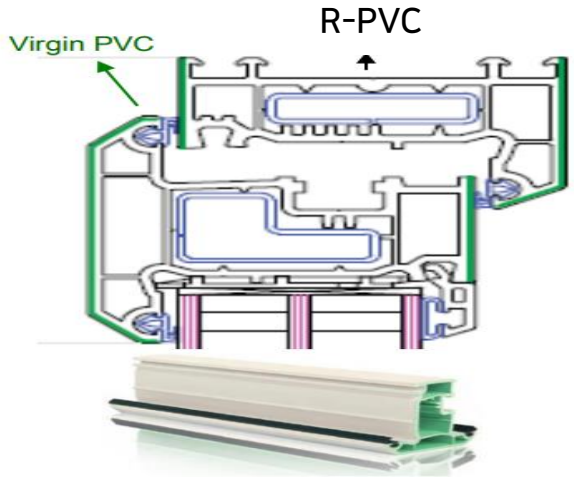
■ Window/door Profiles

○ VEKA (German window profile manufacturer)

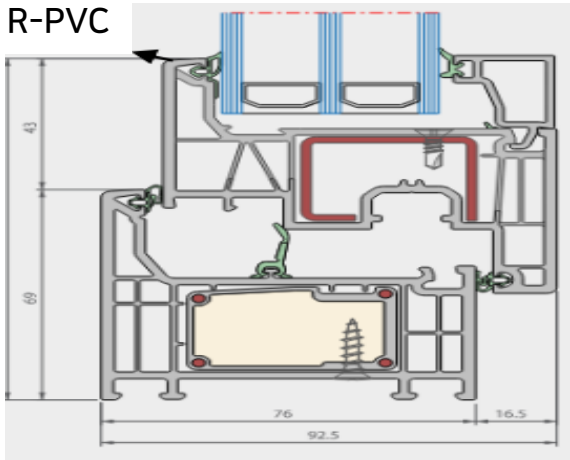
- In window profile production, up to 80% recycled material (R-PVC) is used depending on the window structure, with virgin PVC applied to the surface layer.

○ Deceuninck (Belgian window profile manufacturer)

- Window profiles made with 100% recycled material (R-PVC) throughout, as well as window profiles with 15-30% recycled material (R-PVC) used in certain structural components



<VEKA window/door profile structure>



< Deceuninck window/door profile structure>

Examples of Recycling Materials Usage

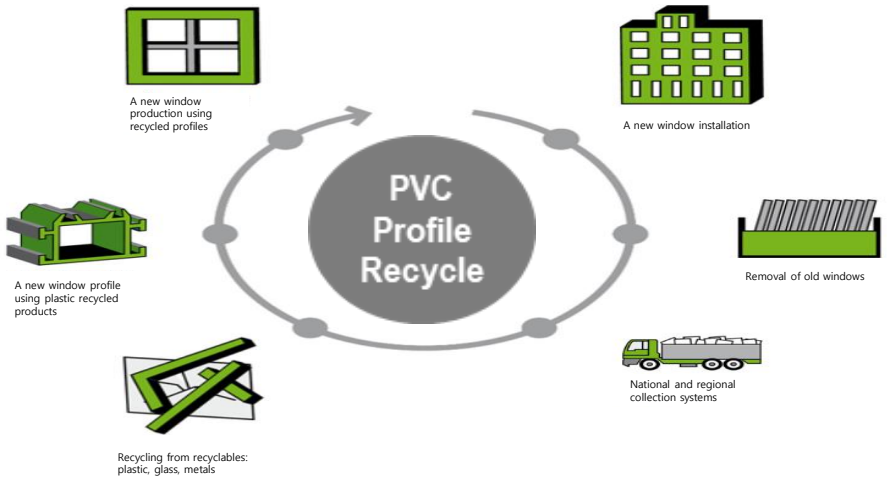
■ Window/door Profiles

○ Rewindo

- In Europe, several window companies have jointly established Rewindo, a window waste collection company, and have developed a network for collecting demolition waste and supplying scrap. Rewindo recycles 44,000 tons of waste annually (as of 2022) generated during window production and demolition, thereby increasing the use of recycled scrap.

○ EPPA

- The European Trade Association of PVC Window System Suppliers (EPPA) has set lead content to be between 0.1% and less than 1.5% in its recycling technology standards and quality regulations, allowing the use of recycled materials for the inner parts of window profiles (co-extrusion), while the outer PVC layer is limited to less than 0.1%, in accordance with EU Commission Regulation 202/923.



Issues to Address

■ Expanding support for the purchase of recycled materials

○ Maintain and expand demand for recycled materials by providing incentives to manufacturers of building products, a major consumer of recycled materials.

■ Managing safety verification of recycled materials

○ Secure verification data on the hazards and safety of recycled materials to proactively address various regulatory standards that directly or indirectly restrict recycling and promote the transition to standards that allow the use of recycled materials.

Issues to Address

■ Identifying demand for recycled materials and developing technologies

○ Develop and establish methodologies for calculating and managing greenhouse gas (CO2) emissions and reductions from building materials, in order to contribute to achieving carbon neutrality.

○ Previous products contained additives designated as harmful substances. However, due to stricter product standards, there are now restrictions on using these recycled materials. Therefore, there is a need to develop technologies for reducing and removing harmful substances to enable the recycling of older products.

※ December 2021: LX Hausys developed Korea's first technology for recycling PVC by extracting it from waste PVC flooring and window profiles.

※ July 2023: Yonsei University developed an eco-friendly technology for decomposing PVC into non-toxic, water-soluble substances using a mechanochemical ball milling system.

※ Mechanochemistry: A method that utilizes mechanical forces to induce chemical reactions. Unlike conventional synthesis methods, it does not use solvents, making it environmentally friendly.

■ Improving Consumer Awareness

○ There is a need to raise positive awareness of recycled products through publicity due to the low awareness of building materials recycling.

Q & A

Thank You