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Korean Textile Collection Rate Targets and EPR Policy Design: Lessons from France's Collection Rate Framework

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ABSTRACT

As the expansion of fast fashion and the shortening lifecycle of apparel products intensify the environmental burden of the textile and clothing industry, the European Union (EU) has introduced stringent regulatory measures, including the EU Strategy for Sustainable and Circular Textiles and the Ecodesign for Sustainable Products Regulation (ESPR). These policies promote the introduction of the Digital Product Passport (DPP), prohibit the destruction of unsold goods, and encourage the implementation of Extended Producer Responsibility (EPR) schemes for textiles. In particular, France, under the Anti-Waste and Circular Economy Law (AGEC), has established a data-driven governance framework centered on the Producer Responsibility Organization (PRO) Refashion, systematically linking market placement, collection volumes, and treatment pathways to set phased collection targets. This study analyzes France's collection rate framework and proposes a policy-oriented model for establishing textile collection targets and introducing an EPR system in Korea. Based on official French reports, the study reconstructs the collection rate calculation mechanism and applies this framework to examine Korea's market placement and textile waste generation structure. The estimated supply-to-waste conversion rate (approximate collection rate) for domestic textiles and apparel in 2023 is approximately 36.1%. The findings emphasize that discussions on collection targets in Korea must be preceded by standardized statistical definitions and an integrated data infrastructure, and propose phased collection targets: short-term (above 20%), medium-term (40%), and long-term (60%), alongside a PRO governance design framework.

Key words: textile and clothing, collection rate, extended producer responsibility (EPR), producer responsibility organization (PRO), AGEC law, refashion, market placement, ESPR, digital product passport (DPP)

1. Introduction

1.1 Research Background

The rapid expansion of fast fashion and the shortening of apparel consumption cycles have made the global textile and clothing industry one of the most environmentally burdensome sectors. The textile sector ranks among the highest in terms of raw material use and water consumption and is recognized as a major contributor to greenhouse gas emissions. Despite this, less than 1% of all textiles worldwide are recycled into new fibers; the majority end up incinerated, landfilled, or repurposed into low-value applications.

In response, the European Commission announced the EU Green Deal in December 2019 and launched a comprehensive economic transformation strategy to achieve carbon neutrality by 2050. The subsequent New Circular Economy Action Plan (2020) strengthened product lifecycle management and designated textiles as one of seven priority sectors requiring urgent circular transition.

The EU Strategy for Sustainable and Circular Textiles (March 2022) introduced mandatory design requirements for durability and repairability, prohibited the disposal of unsold inventory, promoted the adoption of EPR for textiles, and required the implementation of Digital Product Passports (DPP). In July 2023, the European Parliament approved the

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revised Ecodesign for Sustainable Products Regulation (ESPR), which designated textiles and apparel as a priority product category under the 2025–2030 Work Plan. From approximately 2027, textile products sold in the EU market will be required to meet durability, recyclability, and environmental footprint requirements at the design stage, with sustainability information mandated through DPPs. These measures effectively constitute a new global trade standard with structural implications for Korea's apparel industry, which is highly dependent on EU exports.

1.2 Research Objectives and Necessity

EU textile regulations represent not merely an environmental policy but a restructuring of global supply chain norms. As DPP requirements for recycled content, carbon footprint, and circularity information become mandatory, Korean manufacturers will face unavoidable structural transitions toward circular product design. However, domestic analysis of the following critical questions remains insufficient:

- What is an appropriate collection rate for textiles and clothing?
- On what institutional basis have leading countries such as France established their collection rate targets?
- How should realistic, phased collection rate targets be designed considering Korea's industrial structure?
- How should the producer burden structure and PRO governance be designed upon EPR introduction?

This study aims to conduct an in-depth analysis of France's textile collection rate system and operational framework, propose a Korea-specific collection rate target model, and design a phased EPR introduction strategy. Specific research components include:

- Analysis of the collection rate rationale and operational outcomes of France's textile EPR scheme.
- Derivation of policy typologies through comparison with major EU member states.
- Analysis of Korea's textile waste generation structure and treatment practices.
- Setting phased Korea-specific collection rate targets (short-, medium-, and long-term).
- Proposal for PRO governance design and producer responsibility scope.

2. Theoretical Background and Prior Research

2.1 Theoretical Basis for Extended Producer Responsibility (EPR)

Extended Producer Responsibility (EPR) is grounded in the principle of internalizing the environmental costs arising at the end of a product's lifecycle into the producer's decision-making [21]. Based on Pigouvian tax logic, imposing social marginal costs on producers who generate negative externalities restores efficiency in resource allocation. EPR extends this externality internalization principle from the product design stage through to waste treatment.

In Korea, EPR has already been applied to packaging materials, electrical and electronic equipment, and tires, among other categories. However, the textile and clothing sector has yet to be included within EPR scope, a gap identified as a policy deficit relative to the intensifying international regulatory environment [8].

2.2 Circular Economy and the Textile Industry

The Ellen MacArthur Foundation (2017) emphasized that transitioning the textile industry from a linear economy (extract → produce → consume → discard) to a circular model requires the simultaneous operation of three pillars: product design innovation, expanded collection infrastructure, and advanced recycling technology. Circle Economy (2023) noted that more than 70% of European textile waste continues to be landfilled or incinerated, identifying the development of separate collection infrastructure as a prerequisite for circular economy transition.

Among domestic prior studies, Korea Environment Institute (2025) analyzed the structural vulnerabilities in Korea's textile waste treatment system and its dependence on overseas exports, while the Korea Environmental Industry & Technology Institute (2024) surveyed textile

recycling technology trends. However, research focused specifically on collection rate target-setting mechanisms and EPR introduction design remains insufficient.

3. EU Member State Textile Collection and EPR Trends

Through the revised Waste Framework Directive, the EU mandated that all member states establish separate collection systems for textile waste by 2025. Member states are accordingly introducing EPR-based collection systems tailored to their national contexts.

3.1 France

France is the most advanced country in implementing EPR for textiles and clothing. Since 2007, France has operated a textile EPR scheme through the PRO Refashion, which oversees collection, reuse, and recycling. The AGEC Law (2020) prohibits the incineration or landfilling of unsold goods, introduces consumer repair subsidies (bonus réparation), promotes reuse, and incentivizes ecodesign. The distinctive feature of the French model is its basis in a reuse-centered circular expansion strategy, rather than a linear progression from 'high collection rates to high-quality recycling.'

3.2 Netherlands

The Netherlands launched its textile EPR scheme in 2023, designed to impose environmental cost burdens on producers for textile waste treatment. The Dutch system adopts an operational structure focused primarily on cost internalization.

3.3 Other Member States

Sweden is preparing for a phased EPR introduction; Belgium has been operating the voluntary PRO Circletex since 2022. Spain plans to introduce EPR from 2025, with pilot collection programs centered on major brands. As demonstrated by these examples, EU member states are designing varied collection rate targets and cost structures under a shared policy objective, each reflecting their own industrial structure, recycling infrastructure, and consumer market characteristics.

4. Structural Limitations of Domestic Textile Waste Management

Domestic textile waste is managed as either municipal solid waste or general business waste under the Waste Management Act, with some fabric scraps designated as eligible for simplified circular resource recognition under the Enforcement Decree of the Act on the Promotion of Transition to a Circular Economy Society. However, the following structural limitations persist:

- Absence of an EPR scheme for the textile and clothing sector.
- Mixed and inconsistent reuse/recycling statistics and lack of accurate generation data.
- Structural dependency on overseas exports of used clothing.
- Insufficient domestic infrastructure for sorting, separation, and recycling.

A significant portion of domestic textile waste is sorted and exported to developing countries; however, internationally recognized concerns have arisen that much of this exported material is ultimately abandoned or landfilled rather than reused, creating secondary environmental pollution. Furthermore, tightening import restrictions by major recipient countries pose a growing threat to the sustainability of Korea's textile waste management system. Despite this, Korea has no statutory collection rate targets for textiles and clothing, and no systematic EPR scheme has been introduced.

5. Research Methodology

5.1 Research Design

This study uses France's data-driven target-setting approach under the AGEC Law as a reference framework for designing an analytical system to establish Korea-specific collection rate targets and EPR introduction plans. Specifically, the study replicates the market placement

–collection–treatment pathway data calculation and disclosure methodology employed by France's PRO (Refashion) to conduct a comparative analysis comprising: (1) verification of the coherence of France's institutional and data systems; (2) reconstruction of the logic underlying France's target (60% collection by 2028); and (3) identification of data gaps and institutional deficiencies required for domestic application.

5.2 Data Sources and Collection

The analysis of France's TLC (Textiles d'habillement, Linge de maison, Chaussures — clothing, household linen, footwear) sector's EPR operations and collection rate was based on the following official public sources:

- Refashion Annual Activity Reports: collection volumes, sorting efficiency, treatment pathway shares (reuse, physical recycling, energy recovery, disposal), infrastructure operations, and program performance indicators.
- Refashion Market Barometers (Chiffres clés): census-based annual market placement data (tons) and market size trend indicators for TLC products placed on the French market.
- ADEME infographics and dashboards: supplementary use of visualized key indicators based on Refashion data.

5.3 Key Variables and Indicator Definitions

To maintain the same calculation structure as France's target-setting methodology, the following indicators were defined as core variables:

- Market Placement Volume (Mt): Total volume (tons) of TLC products placed on the French market in year t.
- Collection Volume (Ct): Total volume (tons) of TLC products recovered through the separate collection system in the same year.
- Collection Rate (Rt): $Rt = Ct / Mt \times 100$
- Treatment Pathway Share (Tk,t): Share of collected volume by treatment pathway k (reuse, physical recycling, chemical recycling, energy recovery, disposal, etc.).
- Policy Instrument Performance Indicators (auxiliary variables): number of repair bonus claims, number of certified repair shops, scope of eco-modulation application, eco-design guideline compliance items.

5.4 Analytical Procedure

The analysis was conducted in four stages:

- Stage 1 – Institutional-Data Linkage Structure Analysis: Diagramming how AGEC Law policy instruments interact with Refashion's data collection and disclosure system, and defining the scope and definitions of indicators used in target-setting.
- Stage 2 – Reconstruction of Collection Rate Target-Setting Logic: Confirming that the annual collection rate relative to market placement remained in the 30% range, and reconstructing the process by which France's 60% target for 2028 was established (current status diagnosis → gap assessment → policy instrument/budget/infrastructure linkage).
- Stage 3 – Priority Assessment of Policy Instruments and Practical Constraints: Confirming that French policy, in light of constraints on commercial-scale physical and chemical textile recycling, focuses on reuse, repair, and inventory management prior to recycling advancement.
- Stage 4 – Comparative Analysis and Gap Identification for Domestic Application: Identifying domestic data gaps and institutional deficiencies required to apply the French calculation framework, given the fragmented structure of Korea's textile waste statistics.

6. Analysis of France's Collection Rate System

6.1 Recent Collection Data (2023–2024) (Table 1)

Table 1. France textile and clothing collection overview (2023–2024)

Market placement volume	approx. 3.24 billion items	approx. 3.51 billion items
Total collection volume	approx. 268,161 tons	approx. 289,393 tons
Collection rate	–	approx. 36.5%

6.2 Definition and Calculation of Collection Volume

The 'Collection Volume' used in this study refers to the total weight (tons) of post-consumer textile and footwear products recovered through official separate collection systems for the purpose of reuse or recycling. This concept is clearly distinguished from general municipal solid waste and includes only materials that have entered the circular system through a dedicated separate collection mechanism, excluding items disposed of as mixed household waste.

The scope of collection volume includes TLC (Textiles d'habillement, Linge de maison, Chaussures): clothing, household linen, and footwear. Excluded from collection volume statistics are textiles disposed of in general household mixed waste bags, volumes transferred through informal channels (e.g., private peer-to-peer transactions), and waste that has not entered the separate collection system.

6.3 Collection Infrastructure and Treatment Structure

France has established over 47,000 official collection points nationwide, all managed and tracked under the PRO (Refashion) system. The main collection channels are as follows:

- Collection Containers: Accounting for approximately 75% of total collection volume, these represent the primary and most critical collection channel.
- Charitable Organizations and Associations: Volumes received in donation form, incorporated into the official data collection system.
- Recycling Centers and Retail Take-Back Points: Volumes directly returned to municipally operated centers or brand retail locations.

Collected materials are transported to sorting facilities contracted by Refashion and, following quality assessment, classified as follows:

- Reuse: Approximately 60% of total collected volume is in sufficiently good condition to be resold in domestic French or international second-hand markets.
- Recycling: Approximately 30% is processed through physical shredding and repurposed as automotive insulation, industrial wiping cloths, or regenerated yarn.
- Energy Recovery: Remaining volumes unsuitable for reuse or recycling are converted into Solid Recovered Fuel (SRF) for thermal energy recovery.

7. Analysis of Korea's Domestic Collection Rate

7.1 Market Placement Volume Estimation

Market placement volume refers to the total volume of textiles and clothing actually supplied and distributed in the domestic market in a given year. Following the statistical analysis methodology of the EU and OECD, it was calculated as follows:

$$\text{Market placement} = \text{Domestic production} + \text{Imports} - \text{Exports}$$

This study applied the apparent consumption method, assuming no annual inventory changes. Domestic production was estimated by converting the 2023 output value of the apparel and fur manufacturing sector (KRW 17.9 trillion) from the 2024 Mining and Manufacturing Survey (Statistics Korea, preliminary) using HS 61/62 import unit prices (USD/ton), yielding a median estimate of approximately 680,000 tons. Import volume was applied as 473,044 tons (HS chapters 61+62) and export volume as 301,000 tons (HS 6309, used clothing), resulting in a total market placement volume of approximately 852,044 tons.

7.2 Domestic Textile Waste Generation Estimation

Domestic textile waste generation data were drawn from the Ministry of Environment and Korea Environment Corporation's National Waste Generation and Treatment Survey (2023) and from category-specific used clothing and textile waste statistics in the Korea Resource Circulation Information System (KORIS). Municipal sector volumes (separately collected used clothing: 110,938.1 tons; separately collected textile waste: 14,343.7 tons; etc.) and business sector volumes (separately collected used clothing: 2,409.5 tons; facility-generated textile waste: 55,132.9 tons;

etc.) were aggregated to yield a total generation volume of 182,284.2 tons.

7.3 Collection Rate Estimation Results (Table 2)

It should be noted that the collection rate calculated in this study does not represent an official separate collection performance rate. Rather, it constitutes a supply-to-waste conversion indicator (Conversion indicator) that structurally demonstrates the rate at which textiles and clothing supplied to the domestic market transition to waste status. Accordingly, this figure should be interpreted not as evidence of the actual recovery performance of Korea's circular economy system, but as a structural diagnostic indicator reflecting the current market structure and pace of waste conversion.

To contextualize this figure, France's official collection rate based on separate collection performance was approximately 36.5% in 2024, achieved after 17 years of EPR operation with over 47,000 dedicated collection points. In the absence of any formal EPR policy, Korea's supply-to-waste conversion ratio of 36.1% suggests that a substantial volume of textiles already enters waste streams, but through informal or fragmented channels rather than a structured separate collection system. Without policy intervention, the actual "separate collection rate" in the French sense would likely be significantly lower than 36.1%, as a large portion of this waste is disposed of through mixed household waste or unregulated export channels rather than through dedicated collection infrastructure. This underscores the urgent need for EPR-driven collection infrastructure to convert this latent waste flow into a managed circular resource stream.

8. Discussion

8.1 Comparison with the French Case

During the AGEC Law deliberation process, France used Refashion data to quantitatively demonstrate that the annual collection rate relative to market placement volumes remained in the 30% range, and set the 2028 target of 60% on a data-driven basis. The domestically estimated figure of 36.1% is similar to France's initial baseline; however, direct comparison is limited by differences in calculation methodology (France: based on official separate collection performance; Korea: structural analysis of the supply-to-waste conversion).

In contrast, Korea lacks a unified official definition of collection rate, manages production, distribution, and waste statistics in fragmented systems, and conflates reuse, recycling, and export volumes. Therefore, discussions on domestic collection rate targets must be preceded by the standardization of statistical definitions and the development of an integrated data system, prior to simply setting numerical targets.

It is important to note a fundamental methodological difference between the French and Korean collection rate figures. France's collection rate is based on the volume actually recovered through its dedicated separate collection system (i.e., textiles physically collected via official collection points managed by Refashion). In contrast, Korea's figure of 36.1% represents a supply-to-waste

Table 2. 2023 Korea textile and clothing collection rate estimation results

Domestic production (a)	680,000		Median estimate
Imports (b)	473,044		HS 61+62 clothing
Exports (c)	301,000		HS 6309 used clothing
Market placement (a+b−c)		852,044	
Municipal sector subtotal	125,282		Used clothing + textile waste
Business sector subtotal	57,542		Used clothing + textile waste
Total generation (B+C)		182,824	
Collection rate (total generation / market placement)		approx. 36.1%	

conversion ratio, calculated from the volume of textile waste generated (as recorded in national waste statistics) relative to market placement. In other words, France's numerator reflects actual collection performance, whereas Korea's numerator reflects the volume that has transitioned to waste status (an estimated generation figure). This distinction means that the two figures are not directly comparable, and Korea's 36.1% should not be interpreted as equivalent to France's collection rate in terms of circular economy performance.

Regarding the causal relationship between EPR introduction and collection rate improvement in France, Refashion data indicate that France's textile collection volume increased from approximately 100,000 tons in 2006 (prior to EPR introduction in 2007) to over 289,000 tons in 2024, representing a nearly threefold increase. This growth coincided with the expansion of collection infrastructure from fewer than 15,000 to over 47,000 official collection points, directly funded through the PRO's eco-contribution mechanism. While other factors (e.g., growing environmental awareness) may have contributed, the temporal alignment between EPR introduction, infrastructure investment, and collection volume growth strongly supports a causal link.

Regarding the comparability of market structures, France and Korea share several characteristics: both have substantial domestic apparel markets with significant import dependency and active fast fashion segments. However, key differences exist. Korea's used clothing export structure, in which a substantial proportion of post-consumer textiles are sorted and exported to developing countries, represents a structural feature absent from the French model. This export-dependent structure may function both as a facilitator (by creating economic incentives for collection) and as a barrier (by diverting materials from domestic recycling pathways and creating vulnerability to import restrictions by recipient countries). Therefore, EPR policy design for Korea must account for the dual role of the export channel and develop mechanisms to gradually internalize recycling capacity domestically.

8.2 Key Assumptions and Uncertainties in the Estimation

The collection rate estimates in this study are based on the following assumptions, which should be considered when interpreting results:

- Zero inventory change assumption: Differences may arise between actual consumption and estimated volumes, potentially leading to overestimation or underestimation of the collection rate denominator.
- Weight conversion from value-based production data: Differences in the pricing structure of domestic and imported goods are not reflected, so production estimates should be interpreted as range estimates.
- Inclusion of mixed-waste discharge: If non-textile materials are included in municipal or business mixed-waste categories, the collection rate may be overestimated.
- Distortion from overseas transfer structure: Used clothing exports may cause overestimation or underestimation of domestic recycling performance.

9. Conclusions and Policy Recommendations

9.1 Phased Korea-Specific Collection Rate Targets

Applying the target-setting logic of the French model (current status diagnosis → gap assessment → policy instrument linkage), the following phased collection rate targets are proposed for Korea(Table 3):

Table 3. Proposed phased Korea-specific collection rate targets

Short-term	By 2027	Maintain current ~36% level; achieve formal collection rate above 20%	Unify collection rate definition, integrate data, prepare for EPR
Medium-term	2028–2032	Achieve 40%	Introduce EPR, establish PRO, expand collection infrastructure
Long-term	From 2033	Achieve 60%	Eco-modulation, recycling industrialization, activate reuse

A clarification is warranted regarding the short-term target of “above 20%.” While the estimated supply-to-waste conversion ratio stands at approximately 36.1%, this figure reflects total waste generation relative to market placement, not the performance of a formal separate collection system. The 20% short-term target refers specifically to the officially measured separate collection rate under a newly established EPR framework with standardized definitions and tracking infrastructure. Given that Korea currently lacks dedicated textile collection infrastructure comparable to France’s 47,000+ collection points, achieving a verified formal separate collection rate of 20% within the initial EPR implementation period (by 2027) represents a realistic and meaningful policy milestone. This phased approach follows the logic of France’s own trajectory, where the formal collection rate gradually increased from a low base following EPR introduction in 2007.

Achieving the long-term target of 60% collection rate will require not only the expansion of collection infrastructure and reuse markets but also significant advances in recycling industrialization. While current textile recycling is predominantly mechanical (physical shredding for insulation, wiping cloths, or low-grade yarn), the long-term target necessitates the commercial-scale deployment of chemical recycling technologies. Chemical recycling, including processes such as glycolysis and hydrolysis for polyester depolymerization and solvent-based dissolution for cellulosic fibers, offers the potential to convert blended and contaminated textile waste into virgin-quality raw materials, thereby closing the material loop at a level that mechanical recycling alone cannot achieve. Policy support for chemical recycling R&D, pilot plant investment, and offtake agreements should be incorporated into the long-term EPR roadmap to ensure that collection targets are matched by adequate downstream processing capacity.

9.2 PRO Governance Design

Korea's PRO should be structured with the following governance elements:

- Producer Scope: Mandatory membership for domestic manufacturers and importers/distributors placing products above a specified annual volume threshold on the market.
- Contribution Calculation: Proportional to market placement volume (by weight), with eco-modulation adjustments applied based on recyclability.

To enhance producer acceptance of eco-contributions, the eco-modulation structure should incorporate differentiated incentive mechanisms. Specifically: (1) products designed with mono-material composition (e.g., 100% polyester or 100% cotton) should receive contribution discounts of 10–20% relative to blended-material products, reflecting their higher recyclability; (2) products incorporating certified post-consumer recycled content above a threshold (e.g., 30%) should qualify for additional fee reductions; (3) brands that participate in certified take-back programs or provide DPP-compatible product information should receive bonus credits. Conversely, products with hazardous chemical finishes or non-removable mixed-material components (e.g., permanently bonded elastane) should incur surcharges. This graduated incentive structure, modeled on France’s “bonus-malus” system, aligns producer financial interests with circular design objectives and improves the political feasibility of EPR introduction by rewarding proactive compliance.

- Operational Structure: Establishment of an independent non-profit PRO entity, initially supervised by a public agency under the Ministry of Environment, transitioning to a private self-governance model following system stabilization.
- Data Management: Centralized management of market placement, collection, and treatment pathway data through the PRO, with mandatory annual reporting and public disclosure.

9.3 Required Institutional Improvements

Drawing on the French case, the following institutional reforms are required for domestic collection rate policy design:

- Unified Collection Rate Definition: Formally define the official collection rate calculation methodology through legislation or guidelines; distinguish between waste

generation-based and market placement-based metrics to ensure policy evaluation consistency.

- Weight-Based Production Reporting System: Introduce weight-based production statistics in place of value-based output data; mandate weight reporting at manufacturing and import stages.
- Disaggregated Textile Waste Statistics: Establish classification frameworks for clothing, household textiles, and industrial textiles; introduce tracking systems for mixed-discharge volumes.
- Collection Performance Reporting System: Mandate performance reporting for private collectors and sorting facilities; consolidate data management through a PRO-based platform.
- Inventory and Export Management: Introduce unsold inventory reporting; develop a used clothing export volume management system to prevent distortion of domestic recycling performance data.

9.4 Research Significance and Limitations

This study makes a significant policy contribution by applying the data-driven target-setting structure of France's AGEC Law to the Korean context and providing a foundational framework for policy design. It empirically demonstrates that domestic collection rate discussions must first address the definitional question — 'what counts as a collection rate?' — before setting numerical targets.

However, this study is limited by its reliance on publicly available data, which introduces uncertainty in the weight estimation of domestic production volumes. Additionally, differences in collection rate calculation methodologies between France and Korea limit the validity of direct comparisons. Future research should supplement these findings with cost-benefit analyses that incorporate producer contribution levels, collection infrastructure investment scales, and the commercialization timelines of recycling technologies upon actual EPR introduction.

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