

Policy priorities for increasing the Circularity of the Vietnamese Packaging Sector

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Key Messages

- **Improve the sorting and collection of recyclable and reusable materials (paper, plastic, metal, glass):** Implement collection and transportation fee policies based on waste volumes; plan and invest in centralised transfer stations to receive and sort reusable and recyclable waste; establish a collaborative collection mechanism between recycling enterprises and informal waste collectors; introduce a deposit–refund scheme for glass bottle packaging; and apply the best available recycling technologies.
- **Support innovation for developing a circular value chain in the packaging sector:** encourage and provide technical support to promote ecodesign; facilitate access to green finance, such as green credit and green bonds, for waste management and recycling activities; establish and expand markets for secondary materials and recycled products; develop and issue standards and regulations for recycled packaging products; and promote the adoption of recycled product labelling.
- **Design and build a material flow database for four packaging types (paper, plastic, metal, glass):** Facilitate collaboration between the Vietnam Packaging Association (VINPAS) and related industry associations (paper, plastics, glass, beverages, food, etc.); establish a datasharing mechanism covering the stages of import, production, consumption, and disposal;



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Collecting plastic bottles and aluminum cans for recycling

- and conduct regular calculations and publication of CE indicators.
- **Raise public awareness and promote compliance:** Foster public awareness and incentives for separating waste at source and reducing consumption of singleuse packaging; ensure adherence to regulations regarding waste collection fees based on generated waste volume; and promote the use of recycled products.
- **Evaluate initiatives:** Evaluate the impact of implemented and proposed initiatives to determine their efficacy in achieving more circularity. The proposed CE indicators in this study will serve as a reflection of the effectiveness of these initiatives in the coming years.

Summary

Vietnam has been making significant strides to strengthen its environmental regulations and introduce circular economy (CE) measures. The packaging sector is considered a top priority for the development and implementation of CE initiatives due to its substantial economic significance and resource consumption. With over 14,000 enterprises, the sector consumes millions of tonnes of various materials annually [17]. However, the sector faces several challenges, including unreliable and outofdate resourceuse data, compounded by the dominance of informal labour in the recycling industry.

To address these challenges, this policy brief collects insights from industry experts and lifecycle data to map material flows within Vietnam's packaging sector. Four packaging industries are studied: plastic, paper, glass and aluminium. For each sector, six CE indicators are evaluated to benchmark industries and identify areas of improvement. The research findings provide quantitative evidence to support the development of suitable policy solutions for the next phase of Vietnam's transition to a CE within the packaging industry. In particular, the research has contributed to the National Action Plan on the Circular Economy (NAPCE) which was published in January 2025.

Circular Economy in Vietnam

Vietnam is making progress in strengthening environmental regulations and promoting circular economy (CE) initiatives within the packaging sector. A key milestone in this effort is the implementation of the Extended Producer Responsibility (EPR) scheme, which took effect on 1 January 2024 [14] and includes mandatory recycling rates for different industries and defines obligations to contribute to the Vietnam Environment Protection Fund (EPF). A gap remains in identifying how industries perform against the mandated rates and assess their potential EPF contributions.

Building on provisions outlined in the Law on Environmental Protection [16], the country has also published the National Action Plan on the Circular Economy (NAPCE) in January 2025 [15]. This policy document will play a crucial role in identifying and advancing CE activities across priority industries. In the course of this project, the NAPCE was finalised and this study has helped to inform the NAPCE.

Assessing circularity in the packaging sector in Vietnam

To begin assessing circularity in the packaging sector, a functional system must first be defined. The definition of functional systems to study material flows allows for an increased understanding of resource production, use, and disposal and their wider implications for society. The methodology known as Material Flow Analysis (MFA) is directly used for such purposes. MFA helps identify opportunities for legal and policy interventions, as well as effective actions to address environmental challenges [8], informing CE development [11].

In this study, MFA is applied to study four types of packaging sectors: glass, paper, aluminium, and plastic. These are the most commonly used packaging materials in Vietnam and are regulated under the country's Extended Producer Responsibility (EPR) framework. For this research, 17 semistructured twohour interviews were conducted with representatives from government agencies, industry associations, and producers between July and August 2024. The purpose of

these interviews was to gather primary data on the lifecycle of the selected packaging types across four stages: raw material extraction, production, consumption, and disposal, as well as to identify the challenges faced by manufacturers and importers in implementing EPR policies and promoting the CE. The most comprehensive data on material use and recycling available pertain to 2023, which is the year used in this study. Different datasets were collected and combined with the insights from interviews. Secondary data was then obtained to complement the information available. The data sources are described in each packaging type subsection below.

In Vietnam, while data are relatively well documented for the first three stages—raw material extraction, production, and consumption—data related to the disposal stage, including collection, recycling, and waste disposal, remain challenging to compile due to reliance on estimates and aggregated figures. Other data exist; however, they are confidential and need to be handled appropriately.

Six circularity indicators are employed to assess the circularity of the selected packaging sectors, some are known methods while others were developed in earlier collaborations¹:

- **Raw Material Consumption (RMC):** This indicator is introduced to assess the consumption level of raw materials in relation to the total domestic consumption and secondary raw materials. A lower indicator value indicates a lower dependence on raw material sources.
- **Secondary Material Efficiency (SME):** This indicator proposed to reflect the consumption level of secondary materials within the total material usage, including both raw and secondary materials.
- **Circular Material Use (CMU):** This indicator is referenced from the EU's Circular Economy

indicator [4]. The higher rate of this indicator, the greater the reduction in dependence on the extraction and use of raw materials, as they are replaced by secondary materials.

- **Environmental Load (EL):** This indicator is assessed based on the waste generation level of each sector in relation to the total national municipal solid waste (MSW) generation. It is essential for evaluating the impact of the packaging industry on MSW management in Vietnam.
- **Recycling Rate (RR):** This indicator reflects the level of product recovery after the production and consumption process. In other words, it can indicate the capacity to supply secondary materials for the industry.
- **Packaging waste per capita (PgWcap):** This is one of the circular economy indicators under the "Production and Consumption" category of the EU [5]. However, in this study, Vietnam's packaging index will not include wood packaging, unlike the comprehensive EU indicator. In Vietnam, the MSW generation per capita in urban areas ranges from approximately 310 to 410 kg per year [10].

Circularity measures of the four packaging materials

After collecting primary and secondary data, data had to be analysed based on material balance definitions to calculate and determine values according to the proposed Circular Economy (CE) indicators. The calculations were based on aggregated data from 2023, as this is the most recent year with comprehensive annual data available. This study used the STAN 2.7 software to simulate the flow of material streams (Figure 1). STAN ensures that the total input mass is always equal to the total output mass, including both the amount of material converted and

¹ The indicators developed in earlier collaborations are: Raw Material Consumption (RMC), Secondary Material Efficiency (SME) and Environmental Load (EL).

losses. This tool enables a detailed calculation of material flows based on the principle of mass conservation, facilitating the identification of discrepancies or gaps within the data [9], [1], [7],[20] .

The calculation results presented in **Table 1** reflect the circularity levels of the four packaging sectors in 2023, as well as the current development status of these industries. A summary column is also added where all four sectors are aggregated.

Table 1: Circular Economy indicator results for four packaging sectors in Vietnam in 2023.

No.	CE indicator	Name	Unit	Paper packaging	Plastic packaging	Glass packaging	Aluminium Packaging	All 4 packaging sectors
1	RMC	Raw Material Consumption	%	48,1	40,9	54,8	8,5	45,0
2	SME	Secondary material efficiency	%	41,7	43,8	35,9	84,8	42,9
3	EL	Environmental Load	%	7,2	6,8	0,5	0,3	16,0
4	RR	Recycling rate	%	33,5	28,9	14,7	70,0	32,4
5	PgWcap	Packaging waste per capita	kg per capita per year	53,0	22,7	1,8	1,7	82,0
6	CMU	Circular Material Use	%	26.3	39.1	20.6	43.6	28.7

Source: [13] The last column (Vietnam packaging) refers to the aggregated results for the sectors considered.

Paper packaging

The demand for paper packaging is experiencing rapid growth, particularly within the food, beverage, ecommerce, and retail sectors. Paper packaging is increasingly regarded as an ideal alternative to plastic due to its compostability and recyclability. In the Vietnamese market, commonly used paper packaging products include carton and kraft packaging.

Domestically collected recycled paper materials could only meet 47.8% of Vietnam’s market demand in 2023 [18], with the remainder having to be imported from abroad. The paper manufacturing industry in Vietnam, particularly the paper packaging sector, mentioned that they were actively seeking solutions to increase the domestic supply of recycled paper and reduce dependency on imported raw materials [13]. The RMC index for the glass packaging sector is the

highest among the four types of packaging at 54.8%, indicating that glass packaging consumes more natural resources than other sectors. This is similar for the paper packaging sector. Additionally, the EL index for paper packaging is also relatively high at 7.2%, reflecting the significant amount of waste that ends up in landfills or the environment. This is due to the higher consumption and waste generation rate in the paper packaging sector, estimated at 53 kg per person per year.

Based on this study’s interviews, approximately 25% of paper production becomes waste, as this material cannot be reused within the same production processes (compared to ~31% reported in the UK in 2012[12])—unlike the other materials studied, which can be recycled within production cycles, including within manufacturers’ own facilities. However, waste

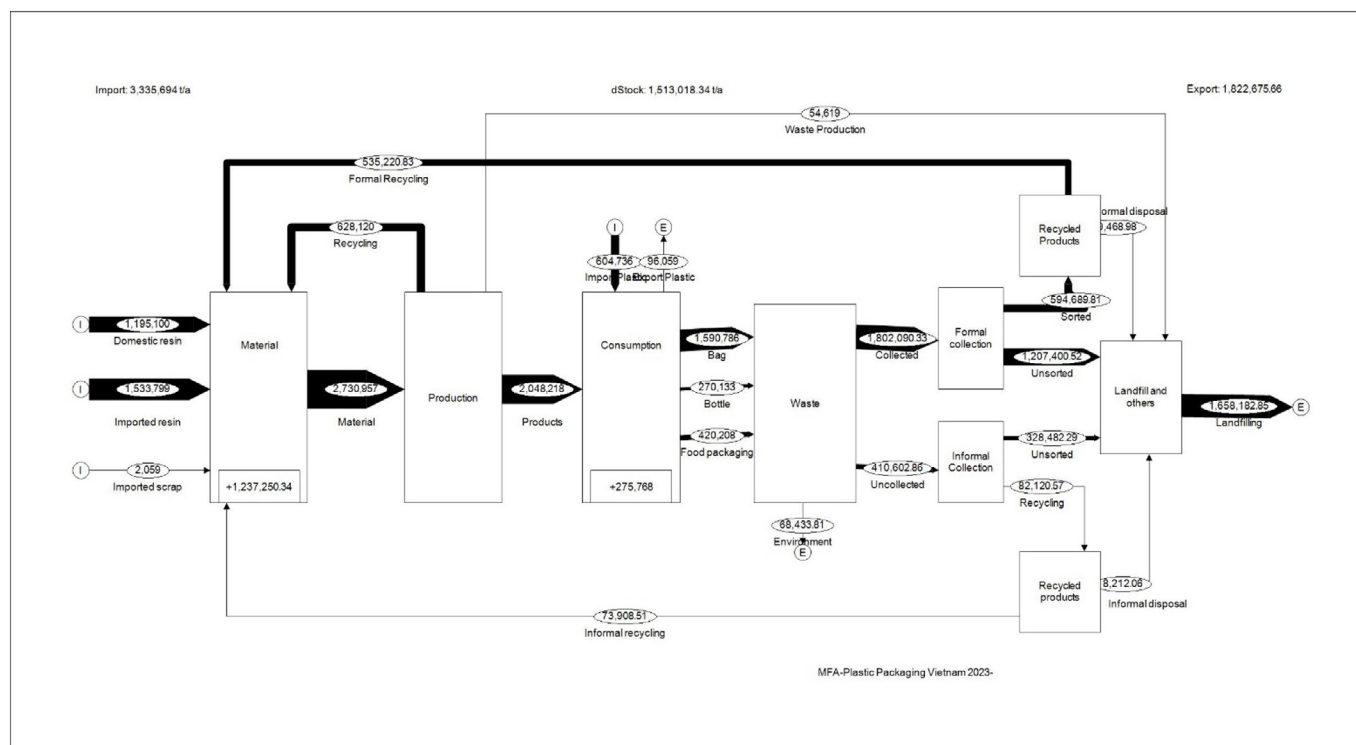
paper can be converted into biomass and used for incineration. This practice has already been implemented in a paper production facility in Vietnam, demonstrating the potential for wider adoption to enhance resource efficiency across the sector.

Plastic packaging

The study collected data on plastic packaging for the three most prevalent types in the Vietnamese market: Polypropylene (PP), Polyethylene (PE), and Polyethylene Terephthalate (PET). These account for around 73% of total imported plastic raw material in 2023 [19]. Vietnam is implementing a series of policy measures to address the significant levels of plastic waste generation. The calculations indicate that the per capita plastic packaging waste generation in Vietnam for 2023 is 22.7 kg, compared

to 36.1 kg in Europe for the same year. The recycling rate of plastic packaging in Vietnam, at approximately 28.9%, remains modest when compared to leading European countries but is relatively higher than that of several Asian nations. According to 2022 data, Germany and Italy achieved significantly higher recycling rates of 51% and 54%, respectively, highlighting a substantial gap in Vietnam's recycling efforts [6]. However, Vietnam outperforms some of its regional counterparts. In 2019, Indonesia reported a plastic recycling rate of only 14% [22], while Thailand achieved approximately 17.6% for key plastic resins, which include materials commonly used in packaging [21]. Meanwhile, China recorded an overall plastic recycling rate of approximately 31% in 2021, though the recycling rate specifically for plastic packaging was lower than the national average [2].

Table 1: Circular Economy indicator results for four packaging sectors in Vietnam in 2023.



Source: [13]

Glass packaging

Although this type of packaging is considered the most promising for promoting reuse in households and recycling in the industry, research conducted in Vietnam [3] indicates that glass packaging has significantly lower recycling, collection, and circularity rates compared to other packaging types. The glass collection system is poorly integrated, resulting in most glass being either discarded or recycled through informal channels.

For packaging materials, the industry interviews conducted for this study suggest that collected glass is less economically valuable than aluminium and other materials covered in this study (see Figure 2), which limits waste collection efforts. Its low value, combined with its bulkiness, often deters waste collectors from picking up glass bottles, as they prefer to use the available space in their collection vehicles for high-value packaging materials. Beverage companies could therefore play a role in facilitating voluntary collection initiatives to address this issue.

Figure 2: Scrap purchase price of packaging

No.	Type of packaging	Unit	Range of Price
1	Carton	VND/kg	4,000-9,000
2	PET bottle	VND/kg	10,000-25,000
3	Aluminium can	VND/kg	40,000-70,000
4	Glass packaging	VND/kg	1,800-2,200

Source: [13]; note (VND = Vietnamese đồng)

Aluminium packaging

Among the four selected types of packaging, the recycling rate of aluminium cans in Vietnam in 2023 is estimated to have reached approximately 70%, which is 7% lower than a comparable study for Vietnam regarding 2022 Chris Sherrington, Sophie Degagny [3]. The high recycling rate can be attributed to the strong potential for collecting aluminium cans in the market, driven

by high collection rates due to the high value of aluminium within the informal waste sector. Aluminium can waste reaching landfills was recorded at a minimal level, with an EL index of just 0.3% in 2023.

However, local recycling processes still rely on outdated technologies that are both inefficient and highly polluting. Currently, Vietnam is implementing several initiatives to improve aluminium can collection and recycling rates, with notable projects such as CantoCan standing out as key contributors.

Challenges facing the packaging industry in promoting the circular economy in Vietnam

The following challenges were identified in this study's interviews:

- The current waste collection and sorting system in Vietnam remains underdeveloped, making it difficult to separate recyclable materials effectively. A significant portion of packaging waste ends up in landfills or is handled through informal collection channels, which are not always efficient or sustainable.
- Although Vietnam has introduced policies to promote the circular economy, there are still gaps in enforcement, incentives, and clear guidelines for the packaging industry. Policies on EPR are still in the early stages, with limited monitoring and support for implementation.
- Many consumers are not fully aware of the importance of waste separation, reuse, and recycling.
- There is a lack of convenient and incentivising mechanisms for returning used packaging.
- Many informal local recycling facilities use outdated technologies that are inefficient and contribute to pollution. This not only reduces the quality of recycled materials and increases the energy requirements of recycling processes, but also discourages large-scale investments in recycling.

- The domestic market for recycled materials remains weak due to inconsistent quality and a preference for virgin materials. Particularly in the case of paper and plastic packaging within the food industry, Vietnamese consumers remain cautious and concerned about the

use of such materials for food and beverages. This hesitation stems from the lack of specific certification or quality assurance measures from the relevant authorities, such as ecolabels or recycling certifications, to guarantee the safety and quality of recycled products.

Conclusion

Based on our Material Flow Analysis results, the circular economy (CE) indicators for 2023 reveal that the aluminium can sector in Vietnam is operating effectively in accordance with the principles of the circular economy, as it scored highest for all calculated indicators of the packaging sectors studied. Conversely, the plastic, paper, and glass packaging industries require more supportive policies and solutions to enhance the effectiveness of CE practices. The informal sector is heavily involved in waste collection and recycling. Policies can aim to support the formalisation of the sector and establish collaborative collection mechanisms so economic benefits from CE policies can reach informal operations. This may increase Gender Equality and Social Inclusion since the

informal sector has higher representation of marginalised groups.

The findings of this study have made a significant contribution to the development of the National Action Plan on the Circular Economy (NAPCE) in Vietnam—an essential document aimed at promoting the advancement of the CE in the country, which was issued in early 2025.

Overarching recommendations involve supporting innovation, improving data practices, coordinating technical data collection and analysis with relevant stakeholder groups, setting guidelines, and improving the legislative framework for CE among industries.

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