Aligning Indic Ecology with Global Green Governance: A Special case of the EU's ESPR and RSW

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The paper examines how the EU's ESPR and Waste Shipment Regulation restructure global circular value chains, generating regulatory and material asymmetries for India. Combining empirical trade analysis, legal assessment, and ecological theory, it advances Green Reciprocity as a framework for reconciling sustainability ambition with industrial transformation and material equity.

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Abstract

The paper examines the structural implications of the European Union's Eco-design for Sustainable Products Regulation (ESPR) and the revised Regulation on Shipments of Waste (EU-RSW) for India's industrial transformation within an evolving circular economy order. While these instruments are formally articulated as environmental governance measures aimed at promoting product durability, traceability, and resource efficiency, their operational design extends beyond ecological objectives. Embedded within market access conditions, export restrictions, and compliance architectures, they reconfigure material flows, alter input availability, and reshape the geography of manufacturing participation. The effects are not confined to trade volumes but intersect directly with industrial planning, investment horizons, and regulatory authority.

The analysis proceeds along three interrelated axes. First, situating ESPR and EU-RSW within the literature on regulatory power, the paper argues that sustainability standards increasingly function as instruments of industrial coordination, structuring global value chains through compliance conditionalities rather than tariffs. Second, an empirical assessment of 154 waste product lines at the HS six-digit level between 2017 and 2023, supplemented by forecast modelling to 2031, demonstrates India's significant dependence on secondary materials of European Union origin. The projected shortfall of approximately USD 743 million in recyclable inputs following the phased implementation of EU export restrictions represents a structural disturbance to cost predictability, capacity utilisation, and long-horizon capital formation across metal-intensive and manufacturing-linked sectors. Circular regulation thus intersects materially with India's Production Linked Incentive framework and export expansion strategy.

Third, the legal examination evaluates ESPR and EU-RSW under the Basel Convention, the OECD Decision, WTO disciplines, and core principles of EU environmental law. Particular attention is given to the OECD/non-OECD differentiation, quantitative export limitations, proportionality under the TBT and SPS frameworks, and the calibration of precaution in emerging technological domains, including New Genomic Techniques. The combined effect reveals a dual asymmetry in regulatory authority and material access that shapes India's policy space within global circular governance.

To address this configuration, the paper advances the Dual Asymmetry and Reciprocal Circularity framework. Indic Ecology is introduced as a counter-epistemological lens that foregrounds cyclical material ethics, decentralised reuse systems, and relational environmental practices embedded in Indian socio-economic contexts. The objective is not cultural assertion but conceptual diversification, expanding the foundations of sustainability governance beyond exclusively technocratic metrics. Building on this analytical intervention, Green Reciprocity is proposed as a normative principle that links environmental obligations to calibrated material access, mutual recognition, and development-sensitive regulatory transition.

The paper concludes by situating the EU–India Free Trade Agreement within this regulatory landscape. Preferential market access, absent coordinated alignment on material stability and compliance proportionality, risks attenuating industrial transformation objectives. A durable circular economy requires institutional arrangements that reconcile ecological ambition with material equity, technological calibration, and reciprocal governance.

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1. Introduction

The Eco-design for Sustainable Products Regulation (ESPR), the revised Regulation on Shipments of Waste (EU-RSW), and the OECD Decision on Transboundary Waste Movements are among the most comprehensive circularity regulations worldwide. These instruments are promoted as technological environmental advances that will extend product life, promote green management, and establish circularity in Europe. They have far-reaching impacts outside the EU. These policies disrupt global value chains, alter resource availability, and burden trade partners by imposing digital traceability requirements, restrictive design criteria, and export restrictions on waste.

The European Union's new sustainable product design guidelines, updated trash rules, and the OECD's cross-border waste accord all advance resource reuse worldwide. Though marketed as practical enhancements to help products last longer and foster ecologically sustainable material management across Europe, their consequences extend beyond the EU. These policies affect international supply chains, make it tougher for some nations to access resources, and place excessive regulatory pressure on other countries by enforcing rigorous design standards, digital tracking systems, or export limits on obsolete goods.

Policy changes affect financial frameworks, legal obligations, and environmental regulations in developing economies such as India, where manufacturers use recycled materials and exporters serve the EU market. Current regulatory influences, global waste standards, and circular-economy research reveal power linkages that drive policy change. Some scholars study how the EU spreads norms through economic power, how colonial legacies affect international waste movements, and others criticise Western-centric recycling notions.

Few **studies** connect the ESPR, EU-RSW, and OECD agreements to transnational environmental governance discussions; none empirically examines these policies' potential adverse effects on India's informal recycling sectors; and the existing literature

[2] Eco-design for Sustainable Products Regulations (ESPR).
[3] Regulation of Shipment of Waste (RSW).

overlooks this—Indigenous knowledge systems as sustainable practices beyond European frameworks. The combination of these limits, WTO trade regulations, fairness concerns, and traditional ecological practices in India is underemphasised. A holistic approach that incorporates international legal frameworks, genuine economic processes, and postcolonial environmental perspectives addresses these concerns.

The argument begins by contextualising ESPR and EU-RSW within the framework of regulatory hegemony, showing how the EU boosts recycling in poorer countries and reinforces it domestically. It then details India's dependence on 154 HS-6 waste imports and predicts shortfalls due to strict EU export controls. It then offers Indic Ecology, a new perspective on cyclical material flows, community-based reuse networks, and relationship-based environmental values that are rarely discussed in green terminology. Finally, it proposes Green Reciprocity, which promotes shared ecological responsibility, fair resource distribution, and balanced circular economies between developed and developing nations. This paper integrates multiple perspectives on global circular governance to offer a new perspective. Instead of seeing India as a policy beneficiary, it argues that the country may offer unique ecological perspectives and innovative norms that promote diverse and fair sustainability pathways. These findings improve environmental decision-making, trade rules, and postcolonial political **ecology discourse on equality.**

2. Literature Review

Research on global regulatory power helps explain the EU's expanding sustainability framework's extraterritorial effects. The Brussels Effect (Bradford, 2020) and regulatory imperialism (Jordana & Levi-Faur, 2006; Büthe & Mattli, 2011) demonstrate how powerful states spread local standards globally through market-access requirements. These studies examine regulatory influence in competition policy, digital governance, and chemical regulation, but not in circular economy policy, waste shipment rules, or design standards, as emerging extraterritorial governance domains.

Similar to environmental regulations and global sustainability governance (Scott, 2011; Young, 2015), "green conditionality" in trade relations has grown; however, ESPR and EU-RSW have not been studied in the context of third-world conditions. The political economy of global garbage movements is also studied. Clapp (2001), Pellow (2007), and Gille (2010) critically analyse discrepancies in hazardous waste trade, showing the historical pattern of North-South waste exportation.

Recent research examines how increased regulation in China, the EU, and OECD countries affects these flows, resulting in "waste protectionism" (Gregson et al., 2020). They do not assess how EU-specific tools affect countries that use secondary materials in industrial manufacturing. E-waste trajectories, plastic commerce, and material circularity studies (Lepawsky, 2018; Brock & Watson, 2019) focus on African and Southeast Asian contexts, while ignoring India's role as a waste-dependent manufacturing hub.

The literature on the circular economy (CE) has grown rapidly, but critics argue that CE rhetoric is Eurocentric, favouring uniform designs, technical progress, and existing recycling infrastructures. (Kirchherr et al., 2017; Korhonen, 2018) According to Hobson & Lynch (2016) and Millington & Barker (2020), European Circular Economy strategies are technocratic and overlook cultural, social, and informal-sector contributions to circularity. CE is usually presented as widely applicable, but current research does not examine how ESPR and the EU-RSW influence global material hierarchies or impose excessive adjustment costs on developing states.

However, Indian writing regarding decentralised, informal, and community-based recycling systems is robust. Researchers study the intricate networks of waste pickers, scrap merchants, repair artisans, and small-scale processors that comprise India's circularity model. (Gidwani, 2015; Ray & Gidwani, 2016; Chaturvedi & Nagar, 2021) The pieces showcase India's indigenous repair culture, resource-efficient material methods, and low-carbon recycling. This work is rarely included in discussions of ecological epistemology or global sustainable governance. The relationship between EU sustainability standards and India's circular systems, and their potential to develop alternative models of circularity, remains poorly researched.

Postcolonial political ecology emphasises epistemic plurality in environmental governance (Escobar, 2018; Nixon, 2011; Robbins, 2012). These publications show how dominant sustainability frameworks ignore indigenous and non-Western ecological knowledge. This research is largely unrelated to discussions of circular economy governance and global trade. No study has used indigenous South Asian ecological theory to critique European sustainability governance or conceptualised circularity through a relational, cyclical, or cultural lens. These works demonstrate major flaws in their analyses.

No research integrates regulatory imperialism, waste governance, circular economy policy, and postcolonial ecology. India's dependence on EU waste streams is not well-documented enough to analyse EU sustainability rules. No academic study proposes a normative concept, such as Green Reciprocity, to enable equitable circularity transitions,

or a non-Western ecological epistemology, such as Indic Ecology, for sustainable governance**.** This study combines international legal analysis, trade-focused empirical assessment, and ecological theory to address these issues.[4] Against this background, the following section situates the EU's sustainability framework within a broader green industrial policy architecture. It examines the scope for coordinated industrialisation with India, drawing on recent manufacturing expansion under the PLI scheme and emerging constraints on access to secondary materials.

2.1. Coordinated Industrialisation with India

The European Union's contemporary green transition strategy extends beyond environmental regulation and increasingly operates as an industrial policy framework. Instruments such as eco-design requirements, digital product passports, circular economy mandates, and restrictions on waste shipments collectively shape production incentives, investment location, and participation in global value chains. While these measures are formally framed as sustainability interventions, their operational effect is to restructure manufacturing geography through regulatory conditions embedded in market access.

This evolving approach reflects a broader shift in EU industrial policy, in which sustainability standards guide capital allocation and production restructuring. Compliance with design, traceability, and circularity requirements has become a prerequisite for integration into European markets. As a result, green regulation functions as a coordinating mechanism for industrial activity, influencing where manufacturing occurs and how value chains are organised.

The Association of Southeast Asian Nations (ASEAN) was formed in 1967 to promote economic growth in the region through regional cooperation. As a vivid manifestation of this cooperation, since 1976, various industrial projects have been designated as ASEAN industrial projects. (Fong, 1986). A relevant institutional parallel may be drawn from ASEAN's experience with regional production integration. ASEAN did not pursue a unified industrial policy framework. Instead, it enabled coordinated manufacturing through trade facilitation, regulatory convergence in selected areas, and regional value chain development. ASEAN industrial cooperation focuses on enhancing regional economic

[4] It is a more focused version of the paper accepted for poster presentation at the GIT, IIM Kozhikode, as part of the Worldview Track: Indic Wisdom, Ecological Values, and Global Leadership, within the conference titled "Economy, Commerce and Social Returns from Indic Solutions: Sustainability and Climate Challenges," held under the 6th International Conclave on Lessons from Invisible India: Viksit Bharat – India @ 2047.

integration, bolstering supply chains, and boosting industrial competitiveness through collaborative projects. The approach allowed member states to absorb the effects of production relocation from China while maintaining national policy autonomy. The outcome was a functionally integrated manufacturing ecosystem, built around complementary specialisation and intra-regional production networks. (Cuyvers, 2019) Further revised initiatives, like the ASEAN Industrial Projects-Based Initiative (AIPBI), aim to foster joint investments, particularly in electric vehicles and high-impact industries, to drive sustainable, innovation-driven growth. (ASEAN, 2025)

The EU–India context presents an opportunity to adopt a similar logic of coordinated industrialisation within a green transition framework. At present, the relationship is characterised by unilateral regulatory transmission, with European sustainability standards shaping production practices in India without corresponding institutional coordination. This asymmetry is becoming increasingly consequential as India scales manufacturing under its Production-Linked Incentive (PLI) scheme across the electronics, automotive components, renewable energy equipment, pharmaceuticals, and advanced manufacturing sectors. These industries are explicitly export-oriented and aligned with global value chains, including those in Europe.

However, the effectiveness of this industrial expansion depends on access to secondary raw materials and on predictable input flows. India remains substantially dependent on imported ferrous and non-ferrous scrap, a significant share of which originates from the OECD and the EU. The EU's Regulation on Shipments of Waste, by restricting exports of recyclable materials to non-OECD countries, introduces material constraints that affect India's manufacturing cost structures and capacity utilisation. This creates a structural tension between EU market access opportunities and the availability of critical production inputs.

In parallel, the EU's digital compliance requirements covering product traceability, eco-design documentation, and digital product passports impose additional adjustment costs on Indian producers. These requirements necessitate firm-level investments in monitoring systems, data infrastructure, and certification processes. While large firms may absorb these costs, smaller manufacturers face disproportionate burdens, potentially limiting their participation in green value chains. Such compliance asymmetries operate in practice as non-tariff barriers, reinforcing unequal integration across production networks.

The EU–India Free Trade Agreement must be assessed against this backdrop. Although the agreement expands tariff-free access for Indian exports, it coexists with sustainability

regulations that alter production conditions independently of trade preferences. Export liberalisation without parallel coordination on regulatory transition and material access risks weakening the industrial outcomes the FTA seeks to promote. Manufacturing competitiveness depends not only on tariff schedules but also on the stability of input supplies and the feasibility of regulatory compliance.

This interaction suggests the need for a more coordinated approach to green industrialisation between the EU and India. Rather than treating sustainability standards as unilateral obligations, a structured framework could be developed around phased regulatory alignment, predictable access to recyclable inputs, and complementary specialisation across green manufacturing segments. Drawing on ASEAN's experience, such coordination would focus on functional integration rather than institutional convergence, enabling India to participate more effectively in European green value chains while preserving domestic industrial policy space.

To this end, we need to integrate Indian approaches into EU Green standards, tailored to Indian climatic and socioeconomic conditions, to enable workforce employment. Three such examples are the Protected Area Design (SLOSS Principles[5]) across the agriculture and forest sectors, and India's traditional conservation practices, which often emphasise community-managed, smaller reserves (such as sacred groves and village forests). This could very well work with EU Standard Integration, wherein protected area models with India's community-based conservation can optimise biodiversity protection while creating local employment in eco-tourism and forest stewardship. Through systematic analysis of India's Wildlife (Protection) Act, 1972, and the EU's Habitats (Council Directive 92/43/EEC of 21), and Birds Directives (Council Directive 92/43/EEC), this study identifies opportunities for legal reforms that could strengthen protected area networks. India's conservation framework encompasses 1,014 protected areas covering 5.32% of the country's geographical area, including National Parks, Wildlife Sanctuaries, Conservation Reserves, and Community Reserves. (Mishra, 2025) A second example is the application of Indigenous Knowledge Systems (IIKS), in which practices such as water harvesting (johads in Rajasthan), mixed cropping, and organic soil enrichment are rooted in local traditions. The same can be embedded within the EU Green Deal frameworks for sustainable agriculture, which can reduce chemical dependency, improve soil health, and generate rural employment through eco-farming cooperatives, as part of Renewable Energy & Climate Cooperation. We could use the leadership in the International Solar

[5] The SLOSS principles—"Single Large or Several Small"—represent a long-standing debate in conservation biology (dating back to 1975) regarding the optimal design of protected areas to maximize biodiversity.

Alliance, and disaster-resilient infrastructure reflects a blend of modern technology with traditional resilience practices. Merging it with the EU's renewable energy standards with India's solar initiatives can create large-scale employment in solar panel manufacturing, installation, and maintenance, while addressing local climatic needs.

In addition to renewable energy and agro-ecological cooperation, coordinated industrialisation may also extend to agricultural biotechnology and climate-resilient production systems. The evolving regulatory debate within the European Union on New Genomic Techniques, particularly CRISPR-based genome editing, reflects a shift from earlier transgenic genetically modified organism frameworks toward more precise forms of genetic modification. Unlike transgenic GMOs, which involve the introduction of foreign genetic material, targeted genome editing enables specific alterations within an organism's existing genome and may achieve outcomes comparable to those achievable through conventional breeding. This distinction has implications not only for risk assessment but also for agricultural productivity, input optimisation, and climate adaptation strategies. For India, where agricultural transformation remains central to rural employment, export competitiveness, and sustainable industrialisation, the regulatory treatment of such technologies affects seed innovation, crop resilience, and compliance costs under sanitary and phytosanitary regimes. Within a coordinated EU–India framework, differentiation between transgenic modification and precision editing could form part of a structured regulatory dialogue aimed at scientific calibration rather than categorical restriction. Such engagement would align agricultural modernisation with broader sustainability objectives, including reduced chemical dependency, improved yield efficiency, and integration into high-value Agri-export value chains. Biotechnology governance in this context becomes part of industrial coordination rather than an isolated compliance obligation. Therefore, pursuing joint action between the EU and India, along the lines of mutual recognition in some of the areas mentioned in Table 1, could help companies conduct mutually beneficial trade once the FTAs come into effect.

Table 1: Indic Approaches Reflected in EU Green Standards

Area	Indic Approach	EU Standard Adaptation	Economic and Socio-economic Impacts
Eco-friendly packaging	Use of biodegradable materials like jute, coir, and banana fibre, suited to tropical climates	EU eco-design and packaging directives encourage the use of biodegradable and recyclable materials.	Expands rural employment in fibre processing and artisanal packaging units
Waste processing & recycling	Community-based waste segregation and composting, adapted to	The EU Waste Shipment Regulation requires traceability and higher recycling standards.	Creates semi-skilled jobs in waste collection, sorting, and recycling plants

Area	Indic Approach	EU Standard Adaptation	Economic and Socio-economic Impacts
	dense urban Indian conditions		
Deforestation-free sourcing	Geo-tagging and traceability of agricultural inputs (e.g., spices, tea, coffee)	EUDR - EU deforestation-free regulation mandates supply chain transparency	Strengthens farmer cooperatives and rural employment through compliance systems
Livestock & food safety	Restrictions on antibiotics in the Indian dairy and poultry sectors	SFS - EU food safety standards align with reduced antibiotic use	Generates veterinary and monitoring jobs while improving export competitiveness
Renewable energy integration	Solar dryers and decentralised biomass are suited to the Indian climate	EU Green Deal Industrial Plan promotes net-zero technologies	Employment in installation, maintenance, and local manufacturing of clean tech

Source: Authors based on multiple sources.

A coordinated EU–India green industrial strategy would acknowledge the interdependence between sustainability goals and manufacturing realities. Regulatory ambition should be paired with mutual industrial support, including transitional compliance routes, recognition mechanisms, and cooperation on circular supply chains. This would shift the current compliance-focused relationship into a collaborative production framework, aiding both Europe's environmental ambitions and India's developmental shift (value added processing and manufacturing activities) by maintaining trust in employment and labour participation across sectors.

3. Theoretical Framework

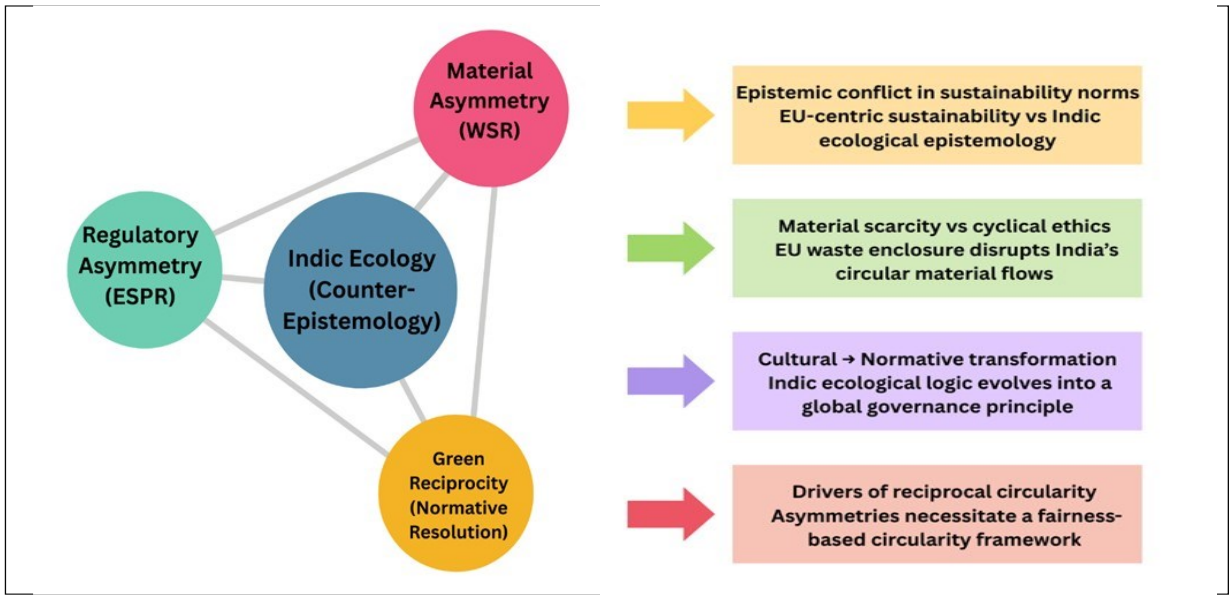
The theoretical framework examines the structural disparities within EU regulation and the epistemic alternatives presented by non-Eurocentric sustainability models. Regulatory Imperialism examines how powerful countries might use their influence to set global rules that affect markets. Indic Ecology is a counter-epistemology founded on cyclical material activities, ethics, and community-oriented environmental knowledge. Bringing different points of view together helps us understand better how ESPR and EU-RSW affect the flow of materials and stories about sustainability.

The paper examines Regulatory Imperialism and Indic Ecology. Jordana and Levi-Faur (2006) argue that powerful entities influence national decision-making through regulations rather than physical force. The EU's environment and trade policies coming together is one example. ESPR and WSR affect both domestic businesses and multinational suppliers seeking to do business in Europe. European companies are more flexible than those in less developed countries because they do not have to make as many changes. Less

developed countries start from a lower standard and have to pay more to restructure their operations, adopt monitoring technologies, and enhance waste management, in line with Western regulations. The restrictions limit exports and make recycling more centralised across Europe, which keeps precious scrap. Brussels quietly tries to get other countries to follow its lead by calling its laws ethical and environmentally friendly. Improving EU regulation beyond its borders alters the movement of products, the beneficiaries of compliance, and the allocation of power within the supply chain.

This study uses Indic Ecology to analyse sustainability from non-Western viewpoints. In these traditions, being responsible for the environment emphasises self-control rather than haste. Instead of simply discarding trash, it is reintegrated into local systems. Today, repairing, reusing, and creating durable goods are crucial. This moral stance highlights the importance of harmony between people and nature through cycles, shared responsibility, and conservation of resources. This perspective sees Indic ecology as a coherent philosophy that challenges the notion of sustainability as outdated mythology. The EU's circular model, which relies on technology, works for some cultures. However, global policy discussions often overlook India's local efforts, shared responsibilities, or informal reuse networks. (Kallummal, Murali, 2015) They also address how India can adopt a long-term, cyclical approach centred on connections and reduced reliance on natural resources. ESPR's goals for design durability, reparability, and recyclability align with South Asian environmental principles and often surpass Western standards. This integration of ideas enhances European regulatory effect assessment tools and recognises diverse viewpoints as a credible foundation for global green policies.

Figure 1: The DARC Model (Dual-Asymmetry and Reciprocal Circularity Framework)



Source: Authors

Figure 1 shows how ESPR and WSR create regulatory and material disparities in EU–India sustainable interactions. Indic Ecology is a counter-epistemology based on cyclical, ethical, and community-oriented ecology. The normative approach, Green Reciprocity, promotes reciprocal access, mutual recognition, and equitable circularity pathways between the EU and emerging economies. The DARC framework explains the tiered asymmetries in EU sustainability standards. Understanding the real-world impact requires empirical research on India's secondary material access structure.

This next section examines India's trading patterns across 154 waste product categories to identify vulnerable areas and regulatory restrictions.

4. Data Analysis[6]

To determine the impact of the EU's and OECD's waste shipment regulations, an analysis of imports and exports of 154 waste products at the 6-digit HS level from 2017 to 23 has been carried out from global and Indian perspectives.

4.1 Methodology followed for the data analysis:

Waste and scrap items covered by the EU's Shipment of Waste Regulation, the OECD's Regulation on the Control of Transboundary Movements of Wastes Destined for Recovery Operations, and the Basel Convention are included. Products were assigned HS codes at the 6-digit level. Three categories are used to classify these items: Green, Amber, and "not defined" for Basel Convention products. World Integrated Trade Solution (WITS) export and import data were used. The EU's share of global trade (imports and exports) for the 154 selected products was calculated by comparing EU trade figures to global totals. The top 90% coverage of the 154 product lines was analysed at the HS 6-digit level, with global and EU imports/exports separated. Based on a seven-year average from 2017 to 2023, WITS data was used to assess EU waste and scrap trade at the HS 6-digit level. The report uses DGCIS data to assess India's HS 6-digit waste and scrap exports and imports from 2017-18 to 2023-24.

4.2 Waste Products: 154 Products Global Analysis

Under this sub-section, the exports and imports of 154 Waste products are traced to identify the leaders in supply (exports) and in markets (imports). This would provide an

[6] The authors would like to acknowledge the contributions of Ms Hari Maya Gurung, Ms Simran Khosla and Mr Ankit Kundu to this Section.

assessment of the largest trading countries and an initial assessment of the need for changes to global strategies for circular-economy value chains.

4.2.1 Global Analysis

With a 36% share of global waste goods imports (USD 4,168.5 billion), the EU accounts for USD 1,510.0 billion in imports. The EU dominates the import market for 90 of 154 products, with at least 36% of global imports. Ninety products were listed, of which the EU imports more than 36% internationally. Further breakdown shows that EU imports are highest for HS 7112.30 (Waste and scrap of precious metal), HS 4501.90 (Cork; waste cork, crushed, granulated), and HS 2620.29 (Slag, ash, and residues) with 94%, 87%, and 86%, respectively.

We examine the EU member countries and the 31 top countries, which account for 90% of worldwide waste product imports. As 13 of 31 countries are EU members, they may absorb a lot of international goods. Other affected countries include India, the 25th largest importer in the world. If we emphasise the top 90% of EU importers in the world for these product groups, 19 of 27 countries are EU members and some of the top importers from the EU of these products, indicating that these regulations will limit the transboundary movement of these imported products, increase EU domestic trade and make the EU a **drain** or a **sinkhole** in the context of global waste trade. Thus, it alters the UNFCCC-promoted concept of the Circular economy and the creation of global value chains in the waste shipping sector. However, when waste shipments themselves become part of **global value chains**, the narrative shifts. Regulatory tensions arise where the Basel Convention and WTO disciplines intersect: waste shipments blur the line between “trade in goods” and “trade in waste,” creating challenges in monitoring compliance, implementing environmental safeguards, and equitably distributing the burden of recycling.

India is among the top 90% of importers of EU waste; therefore, EU laws may create market inefficiencies that raise product prices and hinder India's UNFCCC climate goals. The EU exports 39% of global goods, valued at USD 3,929.7 billion. These include USD 1,513.6 billion in EU exports. Germany remains the world's second-largest exporter of 154 waste products, with USD 148.5 billion in exports and 7.6% of global exports. The value of EU exports worldwide is USD 756 billion. With USD 109.5 billion in exports, Germany dominates the EU and accounts for 14.5% of global waste exports.

When detailed product groups are analysed, the European Union (EU) exports 39% or more of its products under the specified Harmonised System (HS) codes. From 2017 to 2023, the EU has maintained a prominent position in the global market for these commodities.

EU exports account for 39% of global exports across 154 products spanning 81 categories. More detailed analyses reveal that the EU leads in particular specialised products, such as “Cork; waste cork, crushed, granular” (HS 4501.90), which accounts for 92% of global exports. This underscores the EU27’s substantial capacity for cork manufacturing and recycling. The HS code 4401.40, corresponding to “Wood for fuel—sawdust and wood waste,” represents 82% of global exports. Additionally, “Hemp (Cannabis sativa L.); processed” (HS 530290) accounts for 81% of EU exports, underscoring its pivotal role in agriculture and natural fibres. The analysis further indicates that EU nations are key exporters; Europe comprises 17 of the 45 leading global exporters, collectively accounting for 90% of international exports. This demonstrates the EU’s significant export capacity and potential. Among the top 38 EU exporters, 22 account for 90% of total EU exports, with 63.2% of these exports remaining within the EU. Given that most of these exports are intra-EU trade, implementing stricter regulations to limit exports beyond the EU could reinforce the perception of the EU as a repository for Eco-design products and waste.

4.3 India’s Trade in 154 Waste Products: Analysis of Import and Export

This subsection examines India’s trade in 154 identified waste products. The analysis of imports and exports of these waste products from 2017 to 2023 is conducted from India’s perspective to assess the implications of the EU's Shipment Waste Regulations and the OECD Council’s decision on the OECD Legal Instruments for the Control of Transboundary Movements of Wastes Intended for Recovery Operations.

Table 2: India's Imports and Exports of Waste Shipment to the World and the EU (2017 to 2023)

Classification of 154 Waste Shipments	HS Lines	Export (Avg. of 7 Years) in USD Mn.			Import (Avg. of 7 Years) in USD Mn.		
		World	EU	% Share of EU	World	EU	% Share of EU
Amber Waste Shipment	24	689.67	70.74	10.26	1164.58	258.10	22.16
Green Waste Shipment	32	447.78	108.47	24.22	4174.21	479.38	11.48
Not Defined (Basel)	98	4072.51	848.83	20.84	10542.29	1435.67	13.62
Total TLs	152	5209.95	1028.05	19.73	15881.07	2173.15	13.68

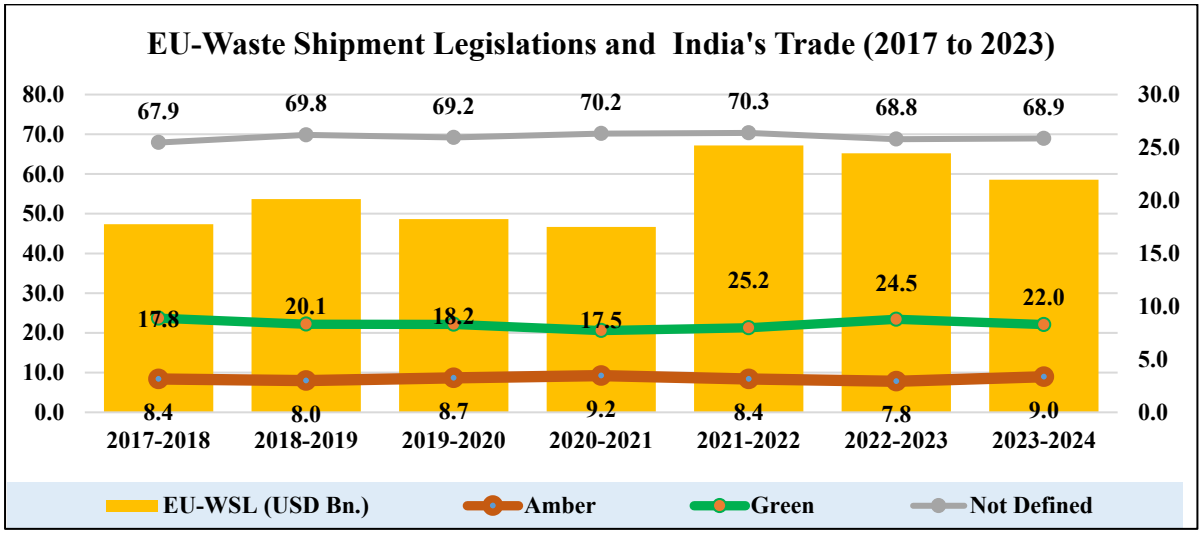
Source: Authors compiled from the online database of DOC<https://tradestat.commerce.gov.in/eidb/default.asp>.

India exports these 154 waste products worldwide, totalling $5,209.9 million USD, of which $1,028 million USD is to the EU. Nearly 21% of these 154 product lines are exported only to the EU market. In terms of imports, almost 14% ($2,173.2 million USD) of these products come solely from the EU. Further analysis reveals that in the Amber waste category, India exports 10% of these products to the EU and imports 22% from the EU. Regarding Green waste, India exports 24% to the EU and imports nearly 11.5% from the

EU. In the unspecified category, where waste categorisation is not provided under the Basel Convention, India's share in exports to the EU is 21%, and imports from the EU are nearly 14%. See Table 2.

The Indian dependence on the EU for the import and export of 154 waste products has been analysed by MTN category. Initial waste product classification is MTN, followed by dependence categorisation based on percentage contribution. Global trade categories for India's EU waste imports and exports are: High Dependency (HD) over 25%, Medium Dependency (MD) from 10% to 24%, and Low Dependency (LD) from 5% to 9%. Shares from 0% to 4% indicate no substantial dependency.

Figure 2: India's Trade with the EU in 154 Products (USD Billion) – 2017 to 2023



Source: Authors compiled from the online database of DOC<https://tradestat.commerce.gov.in/eidb/default.asp>.

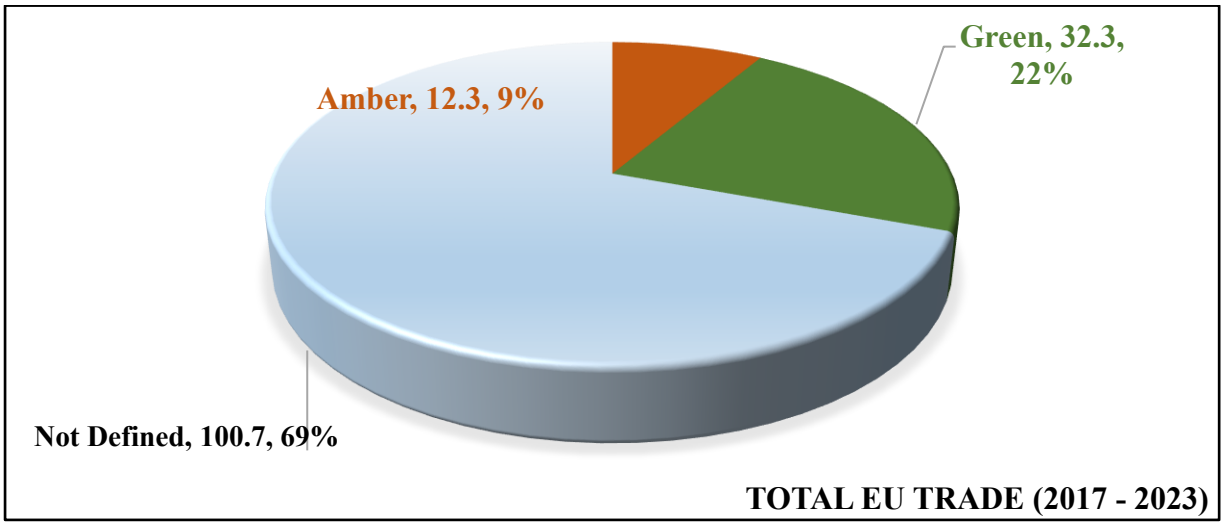
India's trash exports depend heavily on the EU. Non-ferrous metals (810297) make up 98% of exports, followed by artificial fibre, yarn, and fabrics (810297) at 85.4%, ships and floating constructions (890800) at 83.5%, other textile goods (631090) at 81.2%, and other chemical products (382549) at 80.3%. Inorganic chemicals (282739), plastics (282739), leather and leather goods (411520), other minerals (262099), and non-ferrous metals (811300) are medium-level EU-dependent. Other textile items (570500), non-ferrous metals (810930), general industrial machinery (848010), (780200), and non-metallic mineral products (680990) are less dependent.

India imports 87.64% of its inorganic chemicals from the EU (285210), 81.44% of Its Plastics (390450), 71.05% of its leather and leather products (411520), 67.32% of its non-ferrous metals (811300), and 64.83% of its wood and wood products (450190). Other chemical products (340213), ships and floating constructions (890800), non-metallic mineral goods (690390), plastics (390422), and inorganic chemicals (282720) are

moderately EU-dependent waste products. Non-ferrous metals (810930), general industrial machinery (848010), non-metallic mineral products (6809900), and other textile items (570500) have low reliance.

We have analysed yearly trends to address the changing nature of waste trade. In annual terms, India's waste trade with the EU is mapped across 154 products at the 6-digit HS level, totalling US$145 billion from 2017 to 2023. Exports and imports together accounted for nearly USD 18 billion in 2017, rising to USD 22 billion—an increase of USD 4 billion—resulting in a 5 per cent growth rate (See Figure 2).

Figure 3: Compositional Share of India's Exports under the Listed 154 Products.



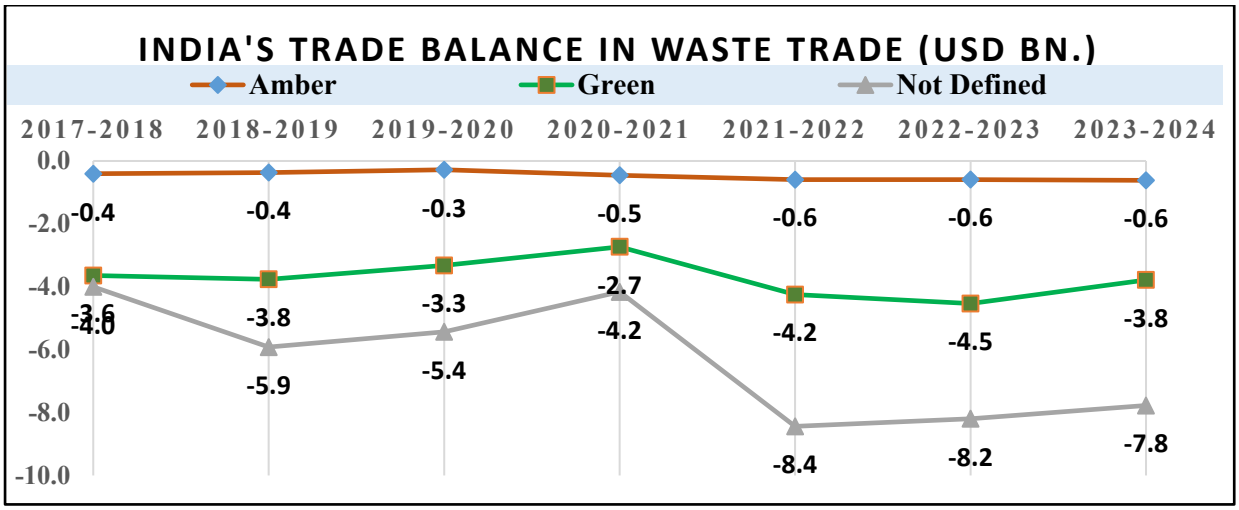
Source: Authors compiled from the online database of DOC<https://tradestat.commerce.gov.in/eidb/default.asp>.

The top trade values and shares were seen in the "Not Defined." The value terms increased from USD 12 billion in 2017-18 to 15 billion in 2023-24, with a growth rate of 5 per cent. Accounting for almost 69 per cent of India's Waste trade, the EU's Shipment of Waste Legislation does not yet define it, which points to the possibility of expansion under the Basel Conventions (see Figure 3). The Not Defined category can be affected as the EU regulation on Waste Shipment expands, as observed in the EU legislative evolution over the past two decades in terms of scope and coverage.

The second largest values were seen in the category of "Green." The value terms increased from USD 4.2 billion in 2017-18 to 4.9 billion in 2023-24, with a growth rate of 4.4 per cent. This segment accounts for almost 22 per cent of India's Waste trade. Nearly all of this segment's exports will halt in 2027 when the EU's Regulation on the Shipment of Waste is fully implemented (see Figure 3). The firms and industries in this category would be forced to undertake a significant reorientation and realignment, and it may also substantially impact India's export potential.

The last category is “Amber.” In value terms, it increased from USD 1.5 billion in 2017-18 to 2.0 billion in 2023-24, with a growth rate of 5.4%. This segment accounts for almost 9% of India's Waste trade (see Figure 3). The firms and industries in this category, too, could be forced to undertake a significant reorientation and realignment, which may also substantially impact India’s export potential.

Figure 4: India's Trade Balance in Waste Trade to the World (USD bn.)



Source: Authors compiled from the online database of DOC<https://tradestat.commerce.gov.in/eidb/default.asp>.

Figure 4 reveals the composition and differences in the trade of waste products in India. For the Study from 2017 to 2023, we can observe a consistent negative trade balance regarding India's exports to the world and its imports across all three predefined categories. A bifurcated analysis of the total Waste products into three categories, as discussed, suggests a kink in the trade balance line graph for the “Not Defined” products list. While the others (Green and Amber Products) showed lesser variations in trade deficits, indicating

4.4 Impact across Broad Descriptions and MTN Product Groups

The new EU regulation on waste shipments, which enforces stricter rules on exporting waste to non-OECD countries, will significantly affect several waste processing companies. These companies must ensure that the facilities that receive their waste undergo independent audits to demonstrate environmentally sound management. Some of the key sectors and companies likely to be impacted include:

- **Scrap Metal Exporters**: Companies dealing with ferrous and non-ferrous metals must comply with new export requirements to non-OECD countries.[7]

[7] Refer to the web page, https://gmk.center/en/news/new-eu-rules-on-waste-transport-will-affect-scrap-exporters/.

- **Plastic Waste Processors**: Firms exporting plastic waste will be banned from exporting to non-OECD countries unless those countries meet strict waste management standards.[8]
- **General Waste Management Companies:** All companies exporting waste outside the EU must ensure compliance with the new regulations, including increased traceability and digitalised procedures.[9,10]

India leads in waste processing, notably municipal solid waste, and can compete globally. This industry and enterprises rely on industrial waste, and many would have considered EU inputs. India imported 78,000 metric tons of plastic garbage and scrap in 2023, down from the year before. The South Asian country imported a record 2,60,000 metric tons of plastic garbage in 2013. After which, Indian imports fell until 2020, when a ban on plastic waste was enacted to improve domestic waste management.

The EU Waste Shipment Regulation would change Indian production facilities to ensure a regular supply. Waste shipment laws within and outside EU borders to safeguard the environment and public health would undermine nation-state sovereignty. Changes to support the circular economy and to dispose of EU waste in an environmentally sustainable way do not entirely help achieve **Sustainable Development Goal** 12. Goal 12 explains why we must change our consumption habits, but business needs have imposed circularity. In the last century, economic and social growth have been accompanied by environmental degradation, which threatens our future development and survival. Improving resource efficiency, addressing the entire economic life cycle, and participating in multilateral environmental agreements can help facilitate a successful transition. SDG 12 calls for lowering consumption, while the new regulation sustains current trends, curbs trash exports, and fulfils the EU's NDC.

4.5 India's Exports to the EU

In further analysis, we find that India exports two broad product categories, which together account for 67% of its exports across these 154 product lines. They are "Wastes which may contain either inorganic or organic constituents" (36%) and "Wastes containing principally organic constituents, which may contain metals and inorganic materials" (31%). Following these are "Waste textile floor coverings, carpets" (9%), "Perfluoroalkoxy alkanes" (7%), "Wastes containing principally inorganic constituents, which may contain

[8] Refer to the web page, https://www.consilium.europa.eu/en/press/press-releases/2024/03/25/waste-shipments-council-signs-off-on-more-efficient-updated-rules/pdf/.
[9] Refer to the web page, https://environment.ec.europa.eu/news/new-regulation-waste-shipments-enters-force-2024-05-20_en.
[10] Refer to the web page, https://www.consilium.europa.eu/en/press/press-releases/2024/03/25/waste-shipments-council-signs-off-on-more-efficient-updated-rules/pdf/.

metals and organic materials" (4%), and "Metal and metal-bearing wastes," with a 3% share, as shown in Table 3 below.

Table 3: Broad Description-Wise India's Export to the EU (2017 to 2023)

Broad Category Description	Average Value in USD Million	% share
Wastes that may contain either inorganic or organic constituents	373.4	36.32
Wastes containing principally organic constituents, which may contain metals and inorganic materials	317.6	30.89
Waste textile floor coverings, carpets	89.3	8.68
Perfluoroalkoxy alkanes	71.8	6.98
Wastes containing principally inorganic constituents, which may contain metals and organic materials	41.8	4.07
Metal and metal-bearing wastes	34.7	3.38
Waste end-of-life motor vehicles containing neither liquids nor other hazardous components	26.9	2.62
Other Wastes Containing Metals	21.4	2.09
Plastic waste, including mixtures of such wastes, containing or contaminated with Appendix 1 constituents, to the extent that it exhibits an Appendix 2 characteristic	13.2	1.28
Metal and metal-bearing wastes- metal-alloy wastes in metallic, non-dispersible form	12.3	1.20
Metal and metal-bearing wastes	9.1	0.88
Metal-bearing wastes arising from the melting, smelting, and refining of metals	6.2	0.60
Plastic waste almost exclusively (5) 4) and consisting of one non-halogenated polymer, including but not limited to the following polymers	4.6	0.44
Glass Waste in Non-dispersible Form	2.2	0.22
Other Wastes Containing Principally Inorganic Constituents, Which May Contain Metals and Organic Materials	1.2	0.12
Solid Plastic Wastes	0.9	0.09
Metal Bearing Wastes	0.9	0.08
Wastes Arising from Tanning and Fellmongery Operations and Leather Use	0.2	0.02
Metal and metal-bearing wastes, but excluding such wastes specifically listed on List B.	0.2	0.02
Ceramic Wastes in Non-Dispersible Form	0.1	0.01
Rubber wastes	0.1	0.00
Untreated cork and wood waste	0.0	0.00
Total	1,028.05	100.0

Source: Authors compiled from the online database of DOC<https://tradestat.commerce.gov.in/eidb/default.asp>.

4.6 Export Dependence of the MTN Sub-Product Group

The dependence of the MTN sub-product groups and the broad description are mapped in this report. The identification of export dependence of Indian sectors can have several impacts on the overall profitability of industrial activity:

- **Market Expansion:** Exporting allows firms to access larger markets, increasing sales and economies of scale. This can spread fixed costs over a larger output, potentially growing profitability. [11]

[11] Wagner, J. Exports, Imports and Profitability: First Evidence for Manufacturing Enterprises. Open Econ Rev 23, 747–765 (2012). https://doi.org/10.1007/s11079-011-9235-z.

- **Revenue Diversification:** By selling products in multiple countries, firms can reduce their dependence on the domestic market. This diversification can help stabilise revenue streams and mitigate risks associated with local economic downturns.[12]
- **Exchange Rate Risks:** Exporting exposes firms to fluctuations in exchange rates. Adverse movements in currency values can erode profit margins if not managed adequately through hedging strategies.[13]
- **Compliance and Regulatory Costs:** Different countries have varying regulations and standards. Complying with these can increase operational costs, impacting profitability. Additionally, tariffs and trade barriers can also affect the cost structure.[14]
- **Competitive Pressure:** Entering international markets often means facing stiff competition from local and global players. This can lead to price wars and reduced profit margins.[15]
- **Logistics and Supply Chain Management:** Managing logistics for international shipments can be complex and costly. Efficient supply chain management is crucial to maintaining profitability. [16]

Investments and industrial activity duration vary by sector, project scope, and economic conditions. Industrial investments typically last 10–20 years. Infrastructure, machinery, and technology require significant resources and time to obtain a 'return on investment', hence this long-term view. Return on Investment (RoI) usually depends on the firm's or sector's profitability and is the difference between input costs and final output prices. Manufacturing, energy, and infrastructure expenditures can take decades to plan, build, and operate. Economic cycles and policy changes can also affect investment duration and performance. Some of these enterprises may close due to declining profitability. This can undermine domestic employment goals and other SDGs related to employability.

The EU's proposed Regulations will reduce Indian enterprises' profitability by denying them USD 744 million in imported waste as an input. To determine the impact of export dependency on Indian industries under the Regulation of Shipment of Waste by 2027, consider sector/product dependence on exports.

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[12] Wagner, J. Exports, Imports and Profitability: First Evidence for Manufacturing Enterprises. *Open Econ Rev* **23**, 747–765 (2012). https://doi.org/10.1007/s11079-011-9235-z.

[13] Ganotakis, P., Love, J. Export propensity, export intensity, and firm performance: The role of the entrepreneurial founding team. *J Int Bus Stud* **43**, 693–718 (2012). https://doi.org/10.1057/jibs.2012.16.

[14] Alexander Klemm and Li Liu, 2019, The Impact of Profit Shifting on Economic Activity and Tax Competition, IMF Working Paper no: WP/19/287, https://www.imf.org/~/media/Files/Publications/WP/2019/wpiea2019287-print-pdf.ashx.

[15] Ibid, Wagner, J.

[16] Ganotakis, P., Love, J. Export propensity, export intensity, and firm performance: The role of the entrepreneurial founding team. *J Int Bus Stud* **43**, 693–718 (2012). https://doi.org/10.1057/jibs.2012.16.

Table 4: Summary Table based on Export Dependence of India on the World

Categorisation based on Dependence on the EU	Amber	Green	Not Defined	EU-SWL
Number of Tariff Lines: 154 numbers				
High Dependence -Above 25% share	1	8	17	26
Moderate Dependence - 10 to 24 % shares	9	8	20	37
No Significant Dependence - 5 to 9 % Shares	3	3	8	14
Low Dependence - 0 to 4 % Shares	9	11	39	59
No Imports	2	2	14	18
Total Number of TLs	24	32	98	154
% Percentage share of the Range total				
High Dependence -Above 25% share	4	31	65	100
Moderate Dependence - 10 to 24 % shares	24	22	54	100
No Significant Dependence - 5 to 9 % Shares	21	21	57	100
Low Dependence - 0 to 4 % Shares	15	19	66	100
No Imports	11	11	78	100
Shares-%	16	21	64	100
% Percentage share to Category total				
High Dependence -Above 25% share	4	25	17	17
Moderate Dependence - 10 to 24 % shares	38	25	20	24
No Significant Dependence - 5 to 9 % Shares	13	9	8	9
Low Dependence - 0 to 4 % Shares	38	34	40	38
No Imports	8	6	14	12
Shares-%	100	100	100	100

Source: Author.

India's Exports to the world with high (above 25% share of the sub-range total) and moderate (10 to 24 % share of the range total) dependence are 26 and 37 tariff numbers, respectively. With nearly 36.4 per cent of MTN sub-product groups and more than 10 per cent dependence on exports, the price of raw materials would be an essential factor in attracting FDI (with green and sustainable technology) and other domestic investments into these product groups. The simple assessment indicates that there would be pressure on profit margins for firms that rely excessively on imported raw materials for exports. This would hamper the overall climate change initiative by raising costs and undermining the cause for which this new regulation was introduced, see Table 4.

4.7 Import Dependence of the MTN Sub-Product Group

The export restrictions/ban that a WTO member imposes must be challenged under the WTO's dispute settlement mechanism. However, the overall dependence on imports can significantly impact the profitability of industrial activity in several ways:

- **Cost Fluctuations:** Importing raw materials or components exposes industries to price volatility in international markets. Fluctuations in exchange rates and global commodity prices can lead to unpredictable costs, affecting profit margins. [17]

[17] Wagner, J. Exports, Imports and Profitability: First Evidence for Manufacturing Enterprises. Open Econ Rev 23, 747–765 (2012). https://doi.org/10.1007/s11079-011-9235-z.

- **Supply Chain Disruptions:** Industries that rely heavily on imports can be vulnerable to supply chain disruptions. Events such as geopolitical tensions, natural disasters, or pandemics can disrupt the supply of essential materials, leading to production delays and higher costs.[18]
- **Tariffs and Trade Policies:** Changes in trade policies, such as the imposition of tariffs or trade restrictions, can increase the cost of imported goods. This can reduce profitability, especially if the industry cannot pass these costs on to consumers. [19]
- **Quality and Standards**: Imported goods may vary in quality and standards. Ensuring consistent quality can be challenging and may require additional investment in quality control measures, impacting profitability.[20]
- **Dependency Risks:** High import dependency can limit an industry's ability to innovate or switch suppliers quickly, reducing competitiveness and profitability in the long run.[21]
- **Economic Conditions:** A high level of imports indicates robust domestic demand and a growing economy. However, if these imports are mainly productive assets, such as machinery and equipment, they can improve the economy's productivity over the long run.

From Table 5 below, it can be seen that India imports "Metal and metal-bearing wastes" from the EU, accounting for 36% of imports for these 154 product lines. This is followed by "Wastes containing principally organic constituents, which may contain metals and inorganic materials" with 13% share, "Wastes Which May Contain either Inorganic or Organic Constituents (12.66%)", "Other Wastes Containing Metals (11.78%)", and "Wastes Containing Principally Inorganic Constituents, Which May Contain Metals and Organic Materials" with 9.58 percent share.

Table 5: Broad Description-Wise: India's Imports from the EU (2017 to 2023)

Broad Category Description	Average Value in USD Million	% share
Metal and metal-bearing wastes	761.4	35.03
Wastes containing principally organic constituents, which may contain metals and inorganic materials	287.6	13.23
Wastes that may contain either Inorganic or Organic Constituents	275.1	12.66
Other Wastes Containing Metals	256.0	11.78
Wastes Containing Principally Inorganic Constituents, Which May Contain Metals and Organic Materials	208.2	9.58
Solid Plastic Wastes	94.5	4.35
Metal and metal-bearing wastes- metal-alloy wastes in metallic, non-dispersible form	73.5	3.38
Perfluoroalkoxy alkanes	67.4	3.10
Plastic waste almost exclusively (5) 4) and consisting of one non-halogenated polymer, including but not limited to the following polymers	46.5	2.14

[18] UN, 2023, Commodity dependence: 5 things you need to know, 09 October, United Nations Trade and Development, https://unctad.org/news/commodity-dependence-5-things-you-need-know,

[19] Leslie Kramer. 2023. How Importing and Exporting Impacts the Economy. Economy. https://www.investopedia.com/articles/investing/100813/interesting-facts-about-imports-and-exports.asp.

[20] Gumata, N., Ndou, E. (2020). What is the impact of imports by stage of production and the manufacturing sector investment growth?. The Secular Decline of the South African Manufacturing Sector. Palgrave Macmillan, Cham. https://doi.org/10.1007/978-3-030-55148-3_7.

[21] Ibid, Gumata.

Broad Category Description	Average Value in USD Million	% share
Plastic waste, including mixtures of such wastes, containing or contaminated with Appendix 1 constituents, to the extent that it exhibits an Appendix 2 characteristic	40.2	1.85
Waste end-of-life motor vehicles containing neither liquids nor other hazardous components	22.1	1.02
Metal and metal-bearing wastes, but excluding such wastes specifically listed on List B.	19.1	0.88
Ceramic Wastes in Non-Dispersible Form	8.3	0.38
Wastes Arising from Tanning and Fellmongery Operations and Leather Use	3.2	0.14
Untreated cork and wood waste	2.9	0.13
Glass Waste in Non-dispersible Form	2.3	0.10
Metal Bearing Wastes	1.7	0.08
Metal-bearing wastes arising from the melting, smelting, and refining of metals	1.2	0.06
Rubber wastes	1.3	0.06
Waste textile floor coverings, carpets	0.6	0.03
Waste having as constituents or contaminants, excluding metal waste in massive form	0.1	0.01
Wastes having as constituents any of the following	0.0	0.00
Other Wastes Containing Principally Inorganic Constituents, Which May Contain Metals and Organic Materials	0.0	0.00
Total	2,173.15	100.00

Source: Authors compiled from the online database of DOC<https://tradestat.commerce.gov.in/eidb/default.asp>.

The preceding study shows that India exports and imports substantial quantities of EU waste. India will have trouble exporting to the EU due to waste containing inorganic or organic constituents; waste containing mostly organic constituents that may contain metals and inorganic materials; waste textile floor coverings, carpets, and perfluoroalkoxy alkanes. New EU shipment regulations will make it difficult for India to import metal and metal-bearing wastes, wastes containing mostly organic constituents, wastes that may contain metals and inorganic materials, and other wastes containing metals.

Many OECD countries may reduce exports due to EU transportation waste laws that raise production costs. From May 21, 2027, this new EU trash transport law may prevent India from importing non-hazardous waste (green-listed waste), which is restricted to non-OECD countries. Non-OECD countries that meet specific environmental conditions in the new Regulation may be granted exceptions. However, they will have to comply with the much higher EU standards, which are higher than international standards, thereby increasing the importing country's costs.

Table 6: Summary Table based on the Import Dependence of India on the World

Categorisation based on Dependence on the EU	Amber	Green	Not Defined	EU-SWL
Number of Tariff Lines: 154 numbers				
High Dependence -Above 25% share	10	10	16	36
Moderate Dependence - 10 to 24 % shares	8	8	21	37
No Significant Dependence - 5 to 9 % Shares	3	1	16	20
Low Dependence - 0 to 4 % Shares	3	10	32	45
No Imports		3	13	16
Total Number of TLs	24	32	98	154

Categorisation based on Dependence on the EU	Amber	Green	Not Defined	EU-SWL
% Percentage share of the Range total				
High Dependence -Above 25% share	27.8	27.8	44.4	100.0
Moderate Dependence - 10 to 24 % shares	21.6	21.6	56.8	100.0
No Significant Dependence - 5 to 9 % Shares	15.0	5.0	80.0	100.0
Low Dependence - 0 to 4 % Shares	6.7	22.2	71.1	100.0
No Imports	0.0	18.8	81.3	100.0
Shares-%	15.6	20.8	63.6	100.0
% Percentage share to Category total				
High Dependence -Above 25% share	41.7	31.3	16.3	23.4
Moderate Dependence - 10 to 24 % shares	33.3	25.0	21.4	24.0
No Significant Dependence - 5 to 9 % Shares	12.5	3.1	16.3	13.0
Low Dependence - 0 to 4 % Shares	12.5	31.3	32.7	29.2
No Imports	0.0	9.4	13.3	10.4
Shares-%	100.0	100.0	100.0	100.0

Source: Author.

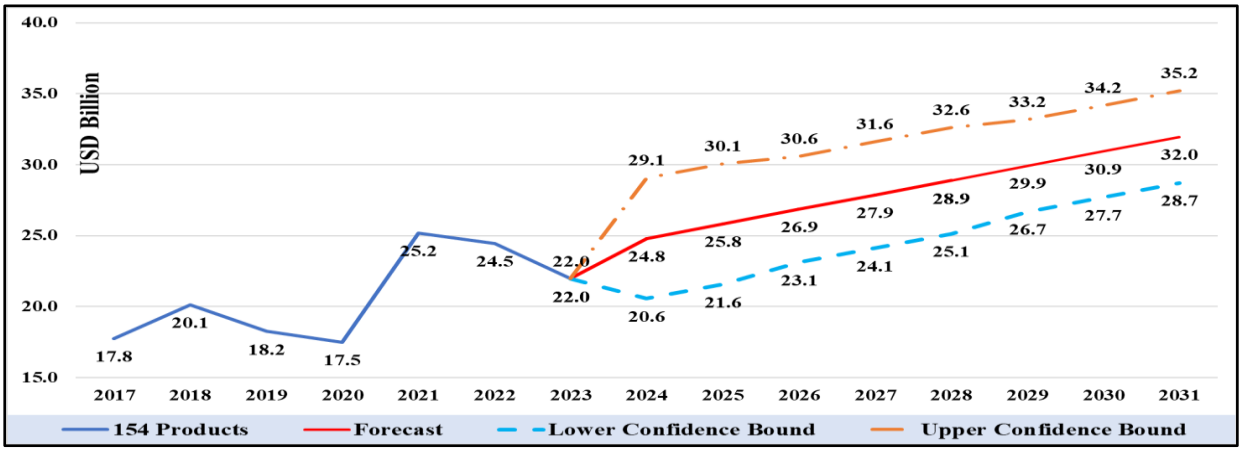
India's Imports to the World, with high (above 25% share of the sub-range total) and moderate (10 to 24 % share of the range total) dependence, are 36 and 37 tariff numbers, respectively. With nearly 47.4 per cent of MTN sub-product groups and more than 10 per cent dependence on exports, the price of raw materials would be an essential factor in attracting FDI (including green and sustainable technology) and other domestic investments into these product groups. The simple assessment indicates that there would be pressure on profit margins for firms that rely excessively on imported raw materials for exports. This would hamper the overall climate change initiative by raising costs and undermining the rationale for this new regulation.

4.8 Forecasting the Waste Products Trade: 2023 to 2031

This sub-section provides a detailed analysis of the long-term implications of the EU Regulation on the Shipment of Waste for the global and Indian economies. At the Global level, the EU's Regulation on the Shipment of Waste Products would result in considerable restructuring across countries.

Figure 5 shows the forecast of the total impact, measured as the overall impact, including all three bifurcations: Green, Amber, and Not Defined. The typical forecast for 2023 to 2031 is provided here, showing that global trade in Waste products will grow at a rate of 4.3 per cent. The trade value will grow from USD 22 billion in 2023 to USD 32 billion in 2031 – an increase of USD 10 billion. In Figure 4, the upper limit forecast for the same trade values for 2023 to 2031 is shown as the broken, dotted red line, indicating that global trade in Waste products will increase at a 5.5 per cent growth rate. The trade value will grow from USD 22 billion in 2023 to USD 32 billion in 2031 – an increase of USD 10 billion.

Figure 5: Forecasted India's Total Trade in Waste Goods with the World (2017 to 2031)



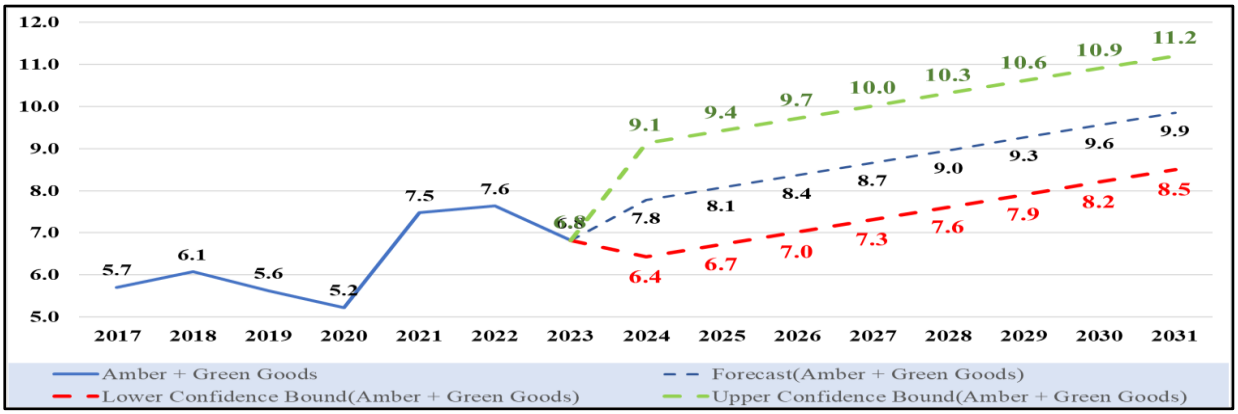
Source: Authors compiled from the online database of DOC<https://tradestat.commerce.gov.in/eidb/default.asp>.

Figure 5 shows the lower-confidence forecast for the same trade values for 2023 to 2031, shown as the broken, dotted blue line. It reveals that global trade in Waste products will grow at a rate of 3.0 per cent. The trade value will grow from USD 22 billion in 2023 to nearly USD 29 billion in 2031, an increase of USD 6.7 billion.

4.9 Total Global Trade in Green and Amber Products Categories

To address the immediate and direct impact, Figure 6 focuses only on the Green and Amber categorised Waste products, which suggest a similar trend of increased overall trade in waste products up to 2031. The typical forecast for 2023 to 2031, as shown in Figure 5, indicates that global trade in green and amber waste products will grow at a rate of 4.4 per cent. The trade value, however, as shown in Figure 6, will grow from USD 6.8 billion in 2023 to USD 9.9 billion in 2031, an increase of USD 3.0 billion. The broken, dotted green line shows the upper confidential bound forecasts for global trade in green and amber waste products from 2023 to 2031.

Figure 6: Forecasted Trade in Green & Amber Goods alone with the World (2017 to 2031)

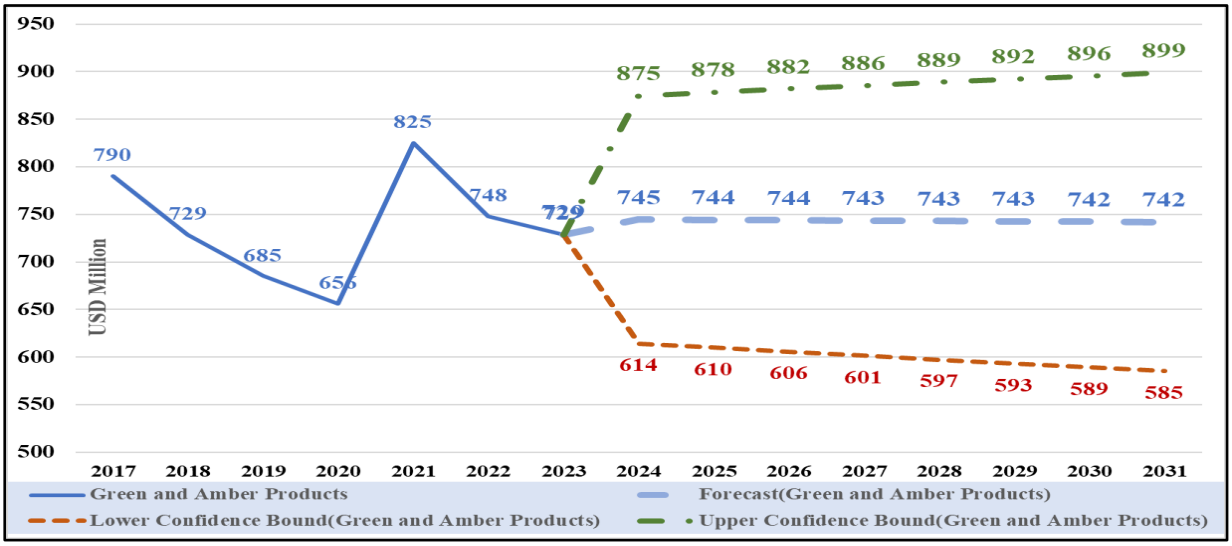


Source: Authors compiled from the online database of DOC<https://tradestat.commerce.gov.in/eidb/default.asp>.

Global trade in waste materials in this category declined in 2024, then grew by 5.8% in 2025. Trade values will rise from USD 4.4 billion in 2023 to USD 11.2 billion in 2031. The broken, dashed red line in Figure 5 shows the lower confidential bound predictions for global green and amber garbage trade from 2023 to 2031. Global trade in waste materials in this category declined in 2024, then grew by 2.7% in 2025. The value of trade will rise from USD 6.8 billion in 2023 to USD 8.5 billion in 2031, an increase of USD 2.3 billion.

Figure 7 shows a similar trend for India's Green and Amber Waste products under the EU's waste shipment legislation. Since 2021, EU waste product imports to India have fallen from USD 0.8 billion in 2021 to USD 0.7 billion in 2023, and the anticipated imports have followed a consistent trend. The gap between high and low confidence has grown since 2023. If EU-RSW eliminates it, most production facilities that supply EU-imported waste will operate at reduced capacity.

Figure 7: Forecasted Impact of Imports from the EU to India (Green and Amber: 2017) to 2031



Source: Authors compiled from the online database of DOC<https://tradestat.commerce.gov.in/eidb/default.asp>.

The EU will implement the new rules in May 2026, excluding exports. Second, in November 2026, all plastic trash exports to non-OECD nations will be outlawed. The Waste Shipment Regulation will apply to all exports in May 2027, the last stage. Like a ban on exports, it would cause the sudden disappearance of USD 743 million worth of scrap and require adequate commercial and legal treatment from affected countries. Thus, the regulation would hinder industrial planning and predictability, which the developed world had championed until now. With the EU's stricter export limits, import availability is expected to drop sharply in 2027. The estimated USD 743 million shortfall in recyclable inputs will lower capacity utilisation, raise costs, and increase the use of virgin material.

Empirical research demonstrates that the EU dominates global waste trade and that India's manufacturing sector relies heavily on EU-sourced secondary materials. A developing legal system formalises and reinforces these discrepancies. The following section examines ESPR and EU-RSW using the Basel Convention, the OECD Decision, WTO law, and EU environmental guidelines to better understand how these regulatory arrangements enhance material dependence and shape India's policy space.

5. Legal Assessment of ESPR, EU-RSW, and OECD Rules

The EU's sustainability policies, particularly the Eco-design for Sustainable Products Regulation (ESPR) and the amended Regulation on Shipments of Waste (EU-RSW), have significant extraterritorial effects on global trade and material flows. In conjunction with the OECD Council Decision on transboundary waste movements and international law, these measures reflect a regulatory system that imposes significant and uneven compliance duties on developing economies such as India. This section examines the Basel Convention, the OECD Decision, the WTO agreements, and the fundamental principles of EU environmental law to determine their legal bases, tensions, and potential discrepancies with WTO law.

5.1 Basel Convention and Its Relevance to EU-RSW and India

The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (*hereinafter,* "the Basel Convention") is the foundational multilateral treaty regulating global movements of hazardous waste.[22] It was adopted on 22 March 1989 and entered into legal force on 5 May 1992.[23] This Convention nearly has universal membership, and aims to "protect human health and the environment against the adverse effects resulting from the generation, transboundary movements and management of hazardous wastes and other wastes"[24], in particular, taking into account the vulnerabilities of developing countries.

In the context of the EU's Regulation on Shipments of Waste (EU-RSW) and India's trade in secondary raw materials, it becomes relevant across four interconnected dimensions, explained as follows:

[22] *See* Basel Convention at Basel Convention > The Convention > Overview (last accessed 26.11.2025)
[23] Ibid
[24] United Nations Environment Program, Basel Convention on the Control of Transboundary Movements of Hazardous Wastes | UNEP - UN Environment Programme (last accessed 26.11.2025)

a. Scope and Obligations

Basel Convention mandates Parties to minimise waste generation, ensure environmentally sound management (ESM), secure Prior Informed Consent (PIC) for transboundary movements and promote environmental justice.[25] These obligations form the legal and principled baseline against which regional measures, such as the EU-RSW, must operate. The EU often adopts a stricter interpretation of these obligations, with implications for third-country exporters, including those from developing economies.

b. EU-RSW as the EU's implementation of Basel

EU-RSW is the EU's instrument for implementing Basel obligations. However, in implementing this, the Regulation exceeds the requirements under the Convention. It expands digital traceability requirements, tightens controls on exports (including a general ban on exporting non-hazardous waste to non-OECD countries unless stringent ESM tests are satisfied), and applies stricter classifications and verification processes than those required under Basel. One aspect of this regulation is a full ban on plastic waste exports, which will take effect on 21st November 2026.[26]

> For example, under these Regulations, exports of waste from the EU to non-OECD countries are generally prohibited unless specific ESM capacity for the waste is evidenced. Only upon the European Commission's affirmative assessment may exceptions be granted.[27] This constitutes a unilateral elevation of Basel commitments, operationalised in line with the EU's Green Deal.

c. Impact on India as a Waste-Import Dependent Economy

According to reports, the Indian waste management market is estimated at $13.60 billion in 2025 and is expected to grow to $19.26 billion by 2030, at a CAGR of 7.21%.[28] In addition, it is reported that India is "heavily reliant on ferrous scrap imports, with Europe being a major supplier. The EU27 countries exported 6.09 million mt. of ferrous scrap to India over January-November 2024, down from 6.17 million mt. in the same period in 2023, according to Eurostat. Data shows that India purchased 8.61 million mt. of ferrous scrap over January-November 2024."[29] While India is a party to the Basel Convention, its domestic recycling industries, particularly in secondary steel, non-ferrous metals and paper, remain substantially dependent on imported secondary raw materials.

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[25] *See* Basel Convention, art. 4,6
[26] EMERITUS insights on the new EU waste shipments regulation and its impact (last accessed 26.11.2025)
[27] New Regulation on waste shipments enters into force - Environment (last accessed 26.11.2025)
[28] India Recycling Technologies Opportunities (last accessed 26.11.2025)
[29] India to seek EU nod for scrap imports under new waste shipment rules | S&P Global (last accessed 26.11.2025)

Of late, however, the regulatory burden on India has increased. This is particularly following the adoption of the 2019 Basel Plastic Waste Amendments.[30], coupled with the EU-RSW's stringent requirements. These developments have raised compliance costs for Indian recyclers, affecting their integration into global circularity-oriented production systems. India should use the FTA negotiations with the EU to garner some concessions on the total ban. This can be seen as a form of *regulatory imperialism*, where domestic producers and exporters in countries like India must comply with standards they did not co-create.

d. Legal Tension

Major concerns in this area include regulatory overreach, particularly for non-OECD countries, and potential conflicts with WTO obligations. Consequently, the interaction between Basel's minimum standards and the EU's expanded requirements has important implications for market access and trade predictability.

5.2 OECD Council Decision and Its Legal Status

The OECD Council Decision on the Control of Transboundary Movements of Wastes Destined for Recovery ('the OECD Decision') establishes a coordinated, simplified procedure for transboundary movements of waste destined for recovery among OECD member states. It established a streamlined regime for waste recovery, interlinked with the Basel Convention, prioritising intra-OECD efficiency.[31]

a. Legal nature

The OECD Decision is binding only on OECD members, owing to their membership commitments. It does not apply to non-OECD economies such as India, nor does it create obligations for them.

b. EU differentiation between OECD and non-OECD countries

The revised EU-RSW incorporates the OECD Decision into EU law, creating distinct regulatory pathways for OECD and non-OECD destinations

Some rules apply for waste transports within the EU and to OECD countries, and different rules apply to waste shipments to non-OECD countries, that is, most of the Asia-Pacific region.[32] This differentiation is not based on the Basel Convention, which does not categorise Parties by OECD membership.

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30 Basel Convention Plastic Waste Amendments (last accessed 26.11.2025)
31 OECD/Legal/0266 (last accessed 26.11.2025)
32 EU Waste Shipment Regulation: Implications and Opportunities for the Asia-Pacific Region (last accessed 26.11.2025)

c. Implication for India

For India, this differentiation results in more onerous conditions for waste destined for recovery, effectively requiring alignment with EU-determined ESM benchmarks, and, in the process, reshaping global value chains. At the same time, it is constraining India's ability to secure critical recyclable materials for sectors that contribute to its circular economy. When one jurisdiction (say, the EU) imposes environmental standards that extend beyond its borders, it affects exporters in other countries. This raises concerns about indirect discrimination and extraterritorial environmental standard-setting and will also impact the goal India signed under the UNFCCC to achieve net zero in the context of CO^2 reductions.

5.3 WTO Law and the Assessment of ESPR and EU-RSW

Considering the scale of India's exports to the EU and the regulatory hurdles discussed above, it is pertinent that we examine the two EU Regulations that form the subject matter of this paper, *viz.* the Ecodesign for Sustainable Products Regulation ('ESPR') and the EU-RSW under WTO law.

a. GATT 1994

a. *Article I, Most Favoured Nation (MFN):* As discussed above, the distinction made by EU-RSW between OECD and non-OECD countries likely constitutes a violation of Article I.

b. *Article III, National Treatment*: While ESPR is formally origin-neutral, some standards imposed by this Regulation tend to impose disproportionately higher compliance costs on non-EU producers, particularly SMEs located in developing countries.

c. *Article XI, Quantitative Restrictions:* The EU-RSW's prohibitions may be interpreted as a quantitative export restriction contrary to Article XI.

d. *Article XX (g), Environmental Exceptions*: The defence for both these Regulations may be found in this Article XX. For the EU to rely on Article XX(g), it must demonstrate even-handedness and non-arbitrary application, which becomes contentious given the OECD/non-OECD differentiation

II. Agreement on Technical Barriers to Trade (TBT)

a. *Technical Regulations:* The ESPR establishes mandatory design, performance, durability and circularity standards for products, including the requirement of *Digital Product Passports*. These constitute technical regulations within the meaning of Annexe 1.1 of the TBT.[33]

[33] Agreement on Technical Barriers to Trade (TBT), Annex 1.1: "Document which lays down product characteristics or their related processes and production methods, including the applicable administrative provisions, with which compliance is mandatory. It may also include or deal exclusively with terminology, symbols, packaging, marking or labelling requirements as they apply to a product, process or production method."

b. *TBT Article 2.2*, "*Not more trade-restrictive than necessary*": Under Article 2.2, technical regulations must not be more trade-restrictive than necessary to achieve a legitimate objective.[34] It may be argued that less trade-restrictive alternatives could achieve the same environmental objectives, especially for products originating from developing economies.

c. *Transparency and International Harmonisation*: Under TBT Articles 2.4[35] Moreover, 2.9, limited consultation with developing-country stakeholders may raise concerns about international standards and timely notifications.

5.4 EU Law Principles Shaping ESPR and EU-RSW

The design of both ESPR and the revised EU-RSW is grounded in foundational principles of EU environmental law. These principles shape the EU's regulatory approach to sustainability and help explain the stringent requirements placed on trading partners.

a. **Precautionary Principle**[36]The precautionary principle authorises regulatory action even in the presence of scientific uncertainty. Article 191(2) of the Treaty on the Functioning of the European Union (TFEU) underpins the EU's conservative approach to waste movement and product sustainability standards.

b. **Circular Economy Principle. Under** the Circular Economy Action Plan, the EU prioritises product longevity, reuse and recycling. ESPR operationalises this through mandatory Ecodesign and DPP obligations, while EU-RSW restricts waste exports to encourage domestic processing. Extended **Producer Responsibility (EPR):** Both ESPR and EU-RSW reflect EPR logic by locating environmental responsibility at the design and production stage rather than in the end-of-life importing jurisdictions of importing countries.[37]

When read together, these measures create a legal environment in which compliance is imposed without adequate consideration of development, and the global value chain models the UN uses to argue for a circular economy reinforce the dynamics of regulatory imperialism. While the legal **analysis** illustrates the formal structure of regulatory asymmetry, it does not fully reflect the epistemic hierarchy that underpins EU sustainability policy. The following section thus turns to Indic Ecology, not as a cultural

[34] Agreement on TBT, art. 2.2: "Members shall ensure that technical regulations are not prepared, adopted or applied with a view to or with the effect of creating unnecessary obstacles to international trade. For this purpose, technical regulations shall not be more trade-restrictive than necessary to fulfil a legitimate objective, taking account of the risks non-fulfilment would create."

[35] TBT, art. 2.2: "Where technical regulations are required and relevant international standards exist or their completion is imminent, Members shall use them, or the relevant parts of them, as a basis for their technical regulations except when such international standards or relevant parts would be an ineffective or inappropriate means for the fulfilment of the legitimate objectives pursued, for instance because of fundamental climatic or geographical factors or fundamental technological problems".

[36] Principles of EU Environmental Law (last accessed 26.11.2025)

[37] *See* Extended Producer Responsibility: Basic Facts and Key Principles (last accessed 26.11.2025): "EPR is a policy approach that makes producers responsible for their products along the entire lifecycle, including at the post-consumer stage. An EPR policy is characterised by the shifting of responsibility (physically and/or economically; fully or partially) upstream to producers; and the provision of incentives to producers to take into account environmental considerations when designing their products."

add-on, but as an alternative environmental philosophy capable of opposing the technocratic and centralised direction of EU circularity frameworks.

The regulatory treatment of New Genomic Techniques, therefore, reflects a broader structural pattern within sustainability governance. Standards are often framed as scientifically neutral, yet their calibration, classification thresholds, and evidentiary burdens carry distributive consequences across jurisdictions with uneven technological capacities. The following question is not limited to biotechnology. It concerns the epistemic foundations upon which sustainability norms are constructed and validated. If regulatory legitimacy rests exclusively on centralised technocratic metrics, alternative modes of ecological reasoning and decentralised sustainability practices risk systematic marginalisation. It is within this context that Indic Ecology is introduced, not as a cultural adjunct, but as an analytical counterpoint to prevailing regulatory paradigms.

6. Indic Ecology as a Counter-Epistemology

Indic ecology presents a distinct perspective on sustainability, in contrast to the technical control frameworks commonly found in current EU policy. Rather than focusing on efficiency or rigid recycling protocols, these traditions highlight moderation, ethical relationships among entities, cyclical patterns in nature, material rejuvenation, and the significance of local practices that sustain and restore resources.

Indian ecological philosophy fundamentally emphasises minimising consumption rather than increasing it. Instead of accelerating materials via rapid systems, it emphasises deliberate constraints and harmonious flows. Repairing or reusing items is a daily practice in domestic settings. Waste segregation at home is frequently practised in modern urban environments. Local recycling initiatives operate independently while ensuring effectiveness. These practices represent practical cycles that effectively reduce emissions and waste, rather than being mere remnants of tradition. They promote the development of durable products, streamlined repair processes, and the use of safer materials, which are also goals outlined in the ESPR policy. These outcomes occur without complex regulations or hierarchical oversight.

India's informal recycling systems demonstrate a fragmented reuse model that stands in stark contrast to the EU's centralised, bureaucratic approach. Instead of centralised management, waste collectors, local merchants, small scrapyards, and community recycling organisations form cohesive networks by leveraging practical expertise and intrinsic motivation. In the absence of digital tracking technologies, these networks effectively distribute products across extensive regions. Nevertheless, under regulations

such as ESPR and EU-RSW, their efforts often go unacknowledged due to non-compliance with Europe's legal frameworks or electronic documentation standards.

Indic ecology offers a framework for critiquing the limited perspective in EU sustainability policy. The EU frameworks primarily rely on standardised measures, product-lifetime tracking, and compliance monitoring rather than on extensive inclusion. These approaches marginalise diverse environmental perspectives, favouring standardised institutions that may prove ineffective in specific contexts. In contrast, traditions rooted in Indian philosophy illustrate that sustainable outcomes can arise naturally from local customs and social frameworks, characterised by decentralised, small-scale production.

This study frames Indic ecology as a framework rather than a traditional narrative, positioning India as both a participant and a potential architect of various pathways to sustainable futures. Changing perspectives is essential when addressing knowledge-based power imbalances in global environmental decision-making. Indic Ecology provides the foundational concepts necessary for diversifying global sustainability strategies, while Green Reciprocity converts this diversity into a normative framework for international collaboration. The following section defines Green Reciprocity as a principle that addresses unequal burdens, restores material balance, and promotes fair pathways to circularity.

7. Green Reciprocity: A Framework for Equitable Circularity

Green Reciprocity presents a novel ethical framework for global circular systems. It proposes that eco-responsibilities, resource rights, and policy burdens should be shaped by shared duties rather than imposed through top-down regulations. This concept arises from the observation that lower-income nations incur greater costs in transitioning to green technologies, even though their recycling initiatives are often overlooked.

In Green Reciprocity, adherence to rigid sustainability standards, such as those outlined by ESPR, should yield corresponding benefits. For example, consistent access to recycled materials, verification of local reuse practices, or customised compliance pathways that account for varying levels of development. If India enhances its manufacturing facilities, implements digital tracking, or provides cleaner products to the EU, a fair return would entail a reliable supply of waste feedstock, reduced regulatory barriers, and the acceptance of comparable environmental outcomes when warranted.

The exchange of materials is significant in this context. The EU's RSW regulation restricts the volume of recyclable waste that Indian industries can process, thereby complicating the availability of essential materials for the reuse of steel, plastic, paper, and chemicals.

The concept of green balance proposes that reductions in waste should be matched with predetermined import levels, collaborative recovery channels, or integrated systems, ensuring that waste is directed to locations equipped to manage it responsibly.

Regulatory reciprocity endorses the concept by facilitating mutual recognition of environmental assessments, labelling initiatives, or monitoring techniques, rather than requiring India to adopt EU digital platforms fully. Agreements of comparable status could enable compliance through local regulations, including Eco-mark, regional recycling approvals, or community-oriented waste management practices.

Green Reciprocity aims to modify unequal power dynamics by integrating mutual exchange into circular systems, thereby promoting collective environmental accountability. This framework allows India to develop a distinctive approach to sustainability that integrates traditional ecological knowledge with international governance structures.

8. The EU–India FTA within the Architecture of Regulatory Asymmetry

The conclusion of negotiations on the Free Trade Agreement between the European Union and India must be analytically situated within the regulatory and material asymmetries identified in this study. The agreement is formally reciprocal and embedded within a rules-based framework; however, its structural significance lies in its coexistence with, rather than displacement of, the unilateral sustainability instruments—ESPR and EU-RSW—that reshape global circular value chains. The question, therefore, is not whether the FTA liberalises trade, but how it reconfigures India's capacity to manage the dual asymmetries, regulatory and material, identified under the DARC framework.

The FTA grants preferential access to 99.5 per cent of India's exports by trade value, with immediate tariff elimination across labour-intensive and manufacturing sectors, which are central to employment generation and export diversification. This expansion of market access strengthens India's outward integration into European value chains. However, the empirical analysis presented earlier demonstrates that a substantial share of these sectors—textiles, leather, chemicals, plastics, engineering goods, and metal-intensive industries—are embedded within input structures that rely on imported secondary materials, including those originating in the EU. The phased restrictions under EU-RSW, projected to generate a measurable shortfall in recyclable inputs, therefore operate in structural tension with the FTA's export expansion logic.

This tension is not merely commercial; it is institutional. The official articulation of the agreement as a "modern, rules-based trade partnership" intended to provide

predictability and long-term investment security must be interpreted in light of industrial planning realities. Predictability, within a manufacturing transition framework, extends beyond tariff schedules to encompass the stability of material flows, regulatory coherence, and the feasibility of compliance. If export liberalisation is accompanied by input constriction, the distributive effects of regulatory sustainability measures may undermine the very industrial scaling that the FTA seeks to promote.

The linkage with India's Production Linked Incentive (PLI) framework renders this interaction more consequential. The PLI architecture, having mobilised significant realised investment across electronics, automotive components, pharmaceuticals, renewable energy equipment, and advanced manufacturing clusters, is structured around incremental production, domestic value addition, and integration into global supply chains. Several PLI-supported sectors are simultaneously beneficiaries of preferential EU market access and dependent on secondary raw materials subject to EU export discipline. In this configuration, the FTA and EU-RSW operate on intersecting axes: one expanding market entry, the other consolidating material retention.

The strategic implication for India is therefore institutional rather than confrontational. The FTA contains structured mechanisms on Technical Barriers to Trade, regulatory cooperation, services liberalisation, and sustainability dialogue. These implementation bodies create a formalised space within which environmental standards, traceability systems, and conformity assessment practices may be examined through equivalence and mutual recognition frameworks. The agreement, being concluded, does not reopen negotiated obligations. However, its cooperative architecture permits calibrated engagement on the operational consequences of sustainability regulation. Within this framework, India can progressively demonstrate the environmental performance of its recycling ecosystem, formal and decentralised, thereby reframing compliance from a jurisdictional hierarchy to an outcomes-based assessment.

Ministerial statements emphasising a "balanced, mutually beneficial" outcome and a reaffirmed commitment to rules-based trade amid geopolitical fragmentation provide the normative vocabulary for such engagement. If the FTA is to function as a stabilising instrument within an uncertain global order, its sustainability and cooperation chapters must internalise the material interdependencies documented in this paper. Climate cooperation mechanisms and envisaged sustainability support may be strategically aligned with upgrading recycling infrastructure, traceability capacity, and environmentally sound management systems within India's circular sectors. Such alignment would

simultaneously enhance India's compliance with EU standards and preserve its integration into global circular production networks.

From the perspective of regulatory dominance, the FTA does not negate the asymmetry embedded in ESPR or EU-RSW. Rather, it modifies the institutional context within which that asymmetry operates. Instead of unilateral regulatory diffusion acting upon a passive trade partner, the FTA embeds a bilateral governance structure capable of incremental recalibration through dialogue, transparency, and implementation review. This shift is procedural rather than doctrinal; yet, in trade governance, procedural embedding often precedes substantive adjustment.

Structurally, therefore, the EU–India FTA should be interpreted as a lever within India's broader circular industrial strategy. By synchronising preferential market access with PLI-led manufacturing expansion, regulatory cooperation mechanisms, and sustainability financing channels, India can mitigate the material vulnerabilities identified in its dependence on EU secondary materials while advancing its developmental and ecological objectives. The agreement does not eliminate regulatory asymmetry; however, it provides the first institutional platform for operationalising Green Reciprocity, not as an abstract critique but as calibrated governance practice within a rules-based trade framework.

9. Conclusion

The paper has argued that the European Union's Eco-design for Sustainable Products Regulation and the revised Regulation on Shipments of Waste operate not merely as environmental instruments but as structural regulatory interventions that reshape material flows, production geographies, and institutional hierarchies within the emerging circular economy architecture. While formally embedded within environmental objectives and partially anchored in multilateral frameworks such as the Basel Convention and WTO disciplines, their operational logic extends beyond those baselines, generating differentiated compliance burdens and material reallocations.

The empirical assessment across 154 HS six-digit waste product lines demonstrates that India's manufacturing expansion remains materially interlinked with European Union-origin secondary inputs. The projected shortfall of approximately USD 743 million in recyclable imports following the phased implementation of export restrictions represents more than a trade adjustment. It constitutes a structural disruption to input stability, cost predictability, and long-horizon industrial planning. Given that capital formation in the manufacturing, infrastructure, and green technology sectors operates over multi-decade investment cycles, regulatory discontinuities of this magnitude alter expected rates of

return, affect capacity utilisation, and potentially reshape investment allocation decisions. Circular regulation, therefore, intersects directly with industrial policy.

The legal analysis confirms that the asymmetry is institutional rather than incidental. The OECD/non-OECD differentiation, elevated environmental verification thresholds, and digital traceability mandates collectively shape the conditions of participation in global circular value chains. While these measures may be defensible under environmental exceptions jurisprudence, their distributive consequences are uneven and reflect differences in technological capabilities and infrastructural readiness. The resulting configuration consolidates material retention within advanced regulatory jurisdictions while externalising compliance adjustment costs to trading partners.

Indic Ecology was introduced within this structural setting as a counter epistemological framework. The objective is not to contest environmental ambition but to interrogate the presumption that sustainability must be mediated exclusively through centralised technocratic control. India's decentralised reuse systems, informal recycling networks, and culturally embedded repair practices demonstrate that circular outcomes can emerge through distributed, relational, and lower-intensity governance structures. The analytical purpose is epistemic diversification rather than normative idealisation, thereby expanding the conceptual foundations of global circular governance beyond standardised compliance metrics. Green Reciprocity translates this epistemic intervention into a governance proposition. It advances the principles of calibrated material access, shared environmental responsibility, and outcome-based recognition, rather than unilateral regulatory diffusion. Circularity in this formulation becomes a negotiated interdependence rather than a compliance hierarchy.

The conclusion of the European Union-India Free Trade Agreement creates an institutional channel for such recalibration. The agreement does not eliminate the structural asymmetries embedded in sustainability regulation. However, it establishes procedural mechanisms, including regulatory cooperation committees, sustainability dialogues, and review platforms, through which transitional equivalence, phased compliance, and infrastructure upgrading can be incorporated within a rules-based framework. Preferential market access and India's Production Linked Incentive strategy remain materially dependent on stable access to secondary inputs. Export liberalisation without material predictability risks weakening the developmental gains the agreement aims to achieve.

The strategic question, therefore, concerns not whether environmental regulation should advance but how its material and distributive consequences are institutionally mediated. In a trade order increasingly characterised by regulatory pluralism and resilience-oriented

governance, the India-European Union interface may evolve from a site of unilateral sustainability transmission into a platform for negotiated circular architecture. A durable global circular economy requires alignment between ecological ambition, material equity, and epistemic plurality. The convergence of India's industrial transition, decentralised circular capabilities, and structured engagement under the Free Trade Agreement provides a feasible pathway toward that recalibrated equilibrium.

References

Ajay, S. G. (2019). Informal waste management practices in India: Structures and challenges. Waste Management & Research, 37(4), 331–338.

Appellate Body Report. (1996). United States – Standards for Reformulated and Conventional Gasoline (WT/DS2/AB/R).

Appellate Body Report. (2001). European Communities – Measures Affecting Asbestos and Asbestos-Containing Products (WT/DS135/AB/R).

Appellate Body Report. (2002). European Communities – Trade Description of Sardines (WT/DS231/AB/R).

Appellate Body Report. (2007). Brazil – Measures Affecting Imports of Retreaded Tyres (WT/DS332/AB/R).

Appellate Body Report. (2012). United States – Measures Concerning the Importation, Marketing and Sale of Tuna and Tuna Products (WT/DS381/AB/R).

ASEAN. (2025). ASEAN INDUSTRIAL PROJECT-BASED INITIATIVES. ASEAN Secreterait. Retrieved February 2026, from https://asean.org/wp-content/uploads/2025/05/Public-version-AIPBI-brochure-vShared3.pdf

Baviskar, A. (2003). Between violence and desire: Space, power, and identity in the making of metropolitan Delhi. International Social Science Journal, 55(175), 89–98.

Benton, D., Coats, E., & Hazell, J. (2021). Digital product passports: Pathways for a sustainable transition. Green Alliance.

Bradford, A. (2020). The Brussels effect: How the European Union rules the world. Oxford University Press.

Brock, A., & Watson, M. (2019). Plastic: Emotions, relations, and making environmental futures. Environment and Planning E: Nature and Space, 2(1), 137–158.

Büthe, T., & Mattli, W. (2011). The new global rulers: The privatisation of regulation in the world economy. Princeton University Press.

Chaturvedi, B., & Nagar, N. (2021). Recycling systems in India: Informality, labour and sustainability. Journal of Resources, Energy and Development, 18(2), 105–124.

Clapp, J. (2001). Toxic exports: The transfer of hazardous wastes from rich to poor countries. Cornell University Press.

Cuyvers, L. (2019, August). The 'ASEAN Way' and ASEAN's development gap with Cambodia, Laos, Myanmar and Vietnam: a critical view. Asia Pacific Business Review, 25(6), 1–22. Retrieved from https://www.researchgate.net/publication/335368046_The_%27ASEAN_Way%27_and_ASEAN%27s_development_gap_with_Cambodia_Laos_Myanmar_and_Vietnam_a_critical_view

Department for Promotion of Industry and Internal Trade. (2024). Production Linked Incentive (PLI) schemes: Progress and sectoral outcomes. Ministry of Commerce and Industry, Government of India, https://dpiit.gov.in/production-linked-incentive-schemes.

Directorate General of Commercial Intelligence and Statistics. (2024). India's foreign trade statistics. Ministry of Commerce and Industry, Government of India, https://tradestat.commerce.gov.in

Escobar, A. (2018). Designs for the pluriverse: Radical interdependence, autonomy, and the making of worlds. Duke University Press.

European Commission. (2022). Impact assessment report accompanying the Ecodesign for Sustainable Products Regulation (ESPR). Brussels, https://environment.ec.europa.eu

Eurostat. (2024). International trade in recyclable raw materials. Statistical Office of the European Union, https://ec.europa.eu/eurostat

Fong, C. (1986, February). ASEAN industrial cooperation: The case of multi-product capacity expansion. European Journal of Operational Research, 23(2), 159–168. doi: https://doi.org/10.1016/0377-2217(86)90235-3

Gidwani, V. (2015). The work of waste: Inside India's informal economy. Transactions of the Institute of British Geographers, 40(4), 575–595.

Gille, Z. (2010). Actor networks, modes of production, and waste regimes: Reassembling the macro-social. Environment and Planning A, 42(5), 1049–1064.

Gregson, N., & Crang, M. (2015). From waste to resource: The trade in wastes and global recycling economies. Annual Review of Environment and Resources, 40, 151–176.

Gregson, N., & Crang, M. (2020). Waste, recycling, and "waste colonialism": The global remaking of waste economies. Geoforum, 114, 10–12.

Gregson, N., Crang, M., Laws, J., Fleetwood, T., & Holmes, H. (2013). Moving up the waste hierarchy: Car boot sales, reuse exchange and the challenges of consumer culture to waste prevention. Resources, Conservation and Recycling, 77, 97–107.

Guha, R. (2000). Environmentalism: A global history. Longman.

Hobson, K., & Lynch, N. (2016). Diversifying and de-growing the circular economy: Radical social transformation in a resource-scarce world. Futures, 82, 15–25.

Invest India. (2024). PLI scheme: Transforming India into a global manufacturing hub. National Investment Promotion & Facilitation Agency, https://www.investindia.gov.in/production-linked-incentive-scheme

Jordana, J., & Levi-Faur, D. (2006). Toward a Latin American regulatory state? The diffusion of autonomous regulatory agencies across countries and sectors. International Journal of Public Administration, 29(4–6), 335–366.

Kallummal, Murali. (2015). India's Reindustrialisation at a Crossroads: Developmental Issue vs. Green. Xplore, 6(1). Retrieved from https://9dec1e70-3d6c-406f-960b-920f18cdab25.filesusr.com/ugd/03b37e_0099f082768c450daf6917082400ceb9.pdf

Kirchherr, J., Reike, D., & Hekkert, M. (2017). Conceptualising the circular economy: An analysis of 114 definitions. Resources, Conservation and Recycling, 127, 221–232.

Korhonen, J., Honkasalo, A., & Seppälä, J. (2018). Circular economy: The concept and its limitations. Ecological Economics, 143, 37–46.

Lepawsky, J. (2018). Reassembling rubbish: Worlding electronic waste. MIT Press.

Millington, N., & Barker, D. (2020). Waste management and circular economy in Europe: A critical review. Environment and Planning E: Nature and Space, 3(3), 762–781.

Mishra, P. (2025, December 14). Optimizing India's wildlife conservation framework using EU network models and SLOSS principles for SDG 15 achievement. *Discover Sustainability, 6*. Retrieved from https://link.springer.com/article/10.1007/s43621-025-02341-z?utm_source=copilot.com

NITI Aayog. (2023). Enhancing manufacturing competitiveness in India. Government of India, https://www.niti.gov.in

Nixon, R. (2011). Slow violence and the environmentalism of people with low incomes. Harvard University Press.

OECD. (2023). SME policy responses to digitalisation and environmental regulation. Organisation for Economic Co-operation and Development, https://www.oecd.org

Pellow, D. N. (2007). Resisting global toxics: Transnational movements for environmental justice. MIT Press.

Ray, R., & Gidwani, V. (2016). The waste-value dialectic: Lumpen urbanisation in contemporary India. Comparative Studies of South Asia, Africa and the Middle East, 36(1), 112–122.

Robbins, P. (2012). Political ecology: A critical introduction (2nd ed.). Wiley-Blackwell.

S&P Global Commodity Insights. (2024). India to seek EU approval for continued ferrous scrap imports under revised waste shipment rules, https://www.spglobal.com/commodityinsights

Scott, J. (2011). Extraterritoriality and territorial extension in EU law. American Journal of Comparative Law, 62(1), 87–126.

UNIDO. (2023). Digital readiness and sustainability compliance in developing country manufacturing. United Nations Industrial Development Organization, https://www.unido.org.

Vogel, D. (1995). Trading up: Consumer and environmental regulation in a global economy. Harvard University Press.

Young, O. R. (2015). Governing complex systems: Social capital for the Anthropocene. MIT Press.

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ABOUT CRIT

India's Foreign Trade Policy (FTP) Statement 2015-20 suggested the need to create a global institution that can provide a counter-narrative on key trade and investment issues from the perspective of developing countries, such as India. To fill this vacuum, a new institute, the Centre for Research on International Trade (CRIT), was established in 2016. The vision and objective of the CRIT were to significantly deepen existing research capabilities and broaden them to encompass new and specialised areas amid the growing complexity of globalisation and its spillover effects in domestic policymaking. Secondly, enhancing the capacity of government officers and other stakeholders in India and other developing countries to deepen their understanding of trade and investment agreements.

ABOUT CWS

The Centre for WTO Studies, a constituent centre of CRIT, predates CRIT, having been established in 1999 as a permanent repository of knowledge and documentation on WTO negotiations. Over the years, the Centre has conducted a robust research programme, resulting in a series of papers on all spheres of interest at the WTO. The Government of India has regularly called upon it to undertake research and provide independent analytical inputs to help develop its positions in various trade negotiations, both at the WTO and other forums, such as Free and Preferential Trade Agreements and comprehensive economic cooperation agreements. Additionally, the Centre has been actively interfacing with industry, Government units, and other stakeholders through its Outreach and capacity-building programmes, organising seminars, workshops, subject-specific meetings, and related activities. The Centre thus also acts as a platform for consensus-building between stakeholders and policymakers. Furthermore, the Centre's expertise has been sought by various international institutions for training and research purposes.

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