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Plastic Waste Regulation and Circular Economy Reform in East Java: A Contemporary Islamic Legal Analysis

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Abstract: East Java faces a critical plastic waste management crisis, generating over 15,700 tons of waste daily, yet its primary legal instrument — East Java Provincial Regulation No. 9 of 2022 — imposes only administrative sanctions and does not systematically incorporate circular economy principles. This regulatory gap between national policy mandates under Law No. 18 of 2008 on Waste Management, Government Regulation No. 81 of 2012, Presidential Regulation No. 83 of 2018 on Marine Debris Management, and the National Long-Term Development Plan 2025–2045 (RPJPN) under Law No. 59 of 2024 and the National Medium-Term Development Plan 2025–2029 (RPJMN) under Presidential Regulation No. 12 of 2025 — and provincial enforcement capacity constitutes the core legal problem addressed in this study. Employing a doctrinal legal research approach through legislative, conceptual, and comparative analysis—supported by empirical data on waste generation and recycling infrastructure—this study examines the adequacy of existing regulations and proposes a circular economy-based legal reform framework. From a contemporary Islamic law perspective, the mismanagement of plastic waste contradicts the maqāṣid al-sharī'ah imperative of environmental preservation (ḥifẓ al-bī'ah). The study finds that current regulations suffer from weak enforcement, the absence of criminal sanctions, a lack of legal recognition for the informal waste sector, and insufficient vertical alignment between national and regional frameworks. This study contributes a structured regulatory gap analysis and a reform model encompassing extended producer responsibility, fiscal incentives, and institutional restructuring—offering a replicable governance framework toward achieving Sustainable Development Goals (SDGs), particularly zero waste and sustainable consumption.

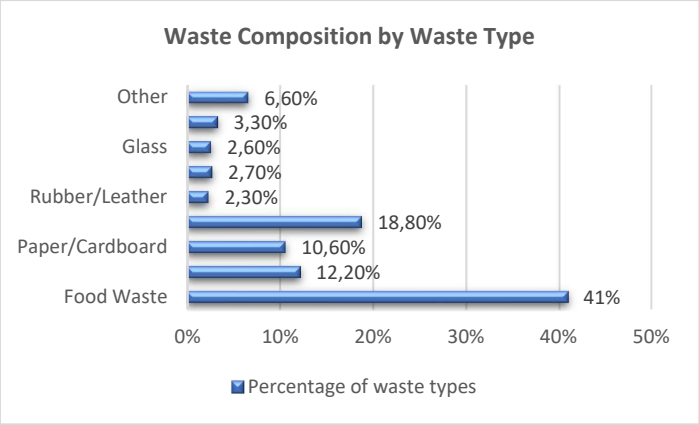
Keywords: Circular Economy; Doctrinal Legal Analysis; East Java; *Maqāṣid al-Sharī'ah*; Plastic Waste; Regulatory Reform.

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INTRODUCTION

Plastic waste in Indonesia has become a significant pollution problem on land and at sea. The United Nations Environment Program reports that Indonesia is the second-largest producer of plastic waste globally, after China. Indonesia has yet to manage plastic waste optimally, leading to widespread issues. Every year, Indonesia produces 3.2 million tons of unmanaged plastic waste, of which approximately 1.29 million tons are disposed of in the ocean. Additionally, an estimated 10 billion plastic bags, equivalent to 85,000 tons, are discarded into the local environment annually.[1] Below are the data for 2023 on waste composition by type, based on a total waste generation of 56,635,188,28 tons/year, calculated using a forecast of national waste generation in Indonesia. 18.80% consists of plastic waste, a type of waste that is difficult to decompose naturally. Of that amount, 8,266,962.4 tons of waste (14.28%) litter the environment, and 0.615 million tons of waste litter the ocean.[2]

Figure 1. Waste Composition by Waste Type



Data Source: National Waste Management Information System, 2023

In fact, plastic waste not only causes environmental pollution and threatens human health but also contributes for climate change. The production, consumption, and disposal

[1] 'Evaluation of Jakstranas Achievements and Future Waste Management Policy Direction Plan', Ministry of Environmenat and Forestry, Jakarta, 2024.

[2] 'Achievements of the Implementation of the National Action Plan for Marine Debris Management 2018-2023', National Coordination Team for Marine Debris Management 2018-2023, Jakarta, 2024.

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of plastic waste release high carbon emissions, worsening climate change.[3] However, on the other hand, the dependence on plastic use in Indonesia is still unavoidable. Data from the Ministry of Industry indicate that plastic consumption in Indonesia was 22.5 kilograms per capita in 2022. This consumption is projected to increase annually due to population growth and increased industrial activities.[4]

Therefore, Indonesia needs a more adequate plastic waste management system so that plastic waste does not become a source of pollution that threatens the health of the environment and humans, and is not neglected in its handling. In other respects, the plastic industry also uses plastic waste as raw materials. In Indonesia, there are 301 plastic industries, with 34 importing companies supplying 260,738 tons of recycled plastic raw materials from 23 countries; the four largest suppliers are the Netherlands, Germany, Belgium, and the United States. Below are the data on Indonesia's plastic waste imports from 2017 to 2022.[5]

Additionally, there are 227 large plastic recycling industries across 13 provinces, as well as 522 small- and medium-sized plastic scrap industries across 27 provinces. This indicates that Indonesia still relies on imported recycled plastic raw materials, pointing to a gap in domestic supply, while also highlighting the potential of the plastic recycling sector within the country. However, the concentration of recycling industries in 13 provinces, with small and medium-sized industries more widely spread across 27 provinces, indicates an imbalance in the infrastructure for plastic waste management. This could lead to high logistics costs and material leakage in regions far from major recycling facilities.[6]

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[3] Zero Waste Indonesia, 'Bagaimana Plastik Berpengaruh Pada Perubahan Iklim', Zero Waste Indonesia, accessed 9 September 2024, https://zerowaste.id/knowledge/bagaimana-plastik-berpengaruh-pada-perubahan-iklim/.

[4] Bambang Ismoyo, 'Konsumsi Plastik RI Tembus 22,5 Kg/Kapita, Kemenperin Minta Pelaku Industri Usung Sirkular Ekonomi', Tribun News, 2023, https://www.tribunnews.com/bisnis/2023/11/15/konsumsi-plastik-ri-tembus-225-kgkapita-kemenperin-minta-pelaku-industri-usung-sirkular-ekonomi#google_vignette.

[5] Ministry of Industry and National Single Window, 'Indonesia Plastic Waste Import: Data of Plastic Industries and Importers (2017–2022)', Ministry of Industry and National Single Window, 2023, https://www.kemenperin.go.id/plastic-waste-import-2017-2022.

[6] Ditjen Industri Kimia Hilir dan Farmasi, 'Disampaikan Pada Rapat Terkait Kepastian Iklim Usaha Industri Plastik Daur Ulang, Tanggal 11 Juli 2025 Di Jakarta', Kementerian Perindustrian, 2025.

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Table 1. Indonesia Plastic Waste Import Data

No	Year	Total Import (kg)
1	2017	442.132,00
2	2018	9.778.304,27
3	2019	17.172.801,86
4	2020	16.493.667,67
5	2021	3.575.918,98
6	2022	1.488.873,00

Data Source: Ministry of Environment and Forestry and National Single Window, 2023

Table 1: Table Headings

No	Country	Amount of Import Year 2023 (Tons)
1	NETHERLANDS	119,345.83
2	GERMANY	38,242.18
3	BELGIUM	23,563.10
4	UNITED STATES	19,177.28
5	SLOVENIA	9,812.75
6	AUSTRALIA	8,815.56
7	SINGAPORE	6,252.14
8	NEW ZEALAND	5,803.61
9	JAPAN	5,043.05
10	UNITED KINGDOM	4,388.90
11	POLAND	4,041.30
12	SPAIN	2,006.55
13	CHINA	1,521.99
14	GREECE	1,282.17
15	MALAYSIA	433.94
16	CROATIA	152.76
17	TURKEY	93.03
18	SOUTH KOREA	91.29
19	HONG KONG	89.51
20	PORTUGAL	66.98
21	THAILAND	46.00
22	TAIWAN	41.94
23	TOTAL	250,311.85

Data Source: National Single Window, 2024

The regulations regarding waste management are outlined in Law Number 18 of 2008 concerning Waste Management, which includes shifting waste previously thrown away into resources and moving upstream waste management to downstream. However,

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these regulations do not yet further regulate how to process waste into resources, let alone regulate waste management using an economic value approach.

The rules for managing plastic waste are regulated in Law Number 18 of 2008 concerning Waste Management, Government Regulation Number 81 of 2012 concerning Household Waste Management and Household Liked-Waste Management, and also Presidential Regulation Number 83 of 2018 on Marine Debris Management. Law Number 18 of 2008 mandates the need for fundamental changes in waste management that have been carried out so far. In accordance with Article 19 of Law Number 18 of 2008, waste management is divided into two main activities, namely waste reduction and waste handling. Article 20 of Law Number 18 of 2008 describes three main activities for reducing waste: limiting waste generation, recycling waste, and reusing waste. These three activities embody the principle of environmentally conscious waste management known as the 3R (reduce, reuse, recycle). Article 22 of Law Number 18 of 2008 describes five main activities in waste handling: sorting, collecting, transporting, processing, and final processing.

Article 4 of Law Number 18 of 2008 states that plastic waste management is carried out through a reduction mechanism that includes limiting the generation of certain waste, recycling it, and/or reusing it. Meanwhile, the term "specific waste" appears for the first time in Government Regulation Number 27 of 2020, which defines it as waste that requires special handling due to its characteristics or potential impact on health and the environment. In this regulation, "specific waste" refers to waste that, due to its dangerous nature, requires more stringent treatment and management measures. In practice, plastic waste is typically collected for recycling via the reduce, reuse, recycle (3R) framework, which is commonly facilitated through waste banks. The establishment of waste banks is outlined in Minister of Environment and Forestry Number 14 of 2021 concerning Solid Waste Management through Waste Banks, which emphasises economic principles in waste management. The application of the 3R approach, education, and changes in waste management behaviour, in turn, indirectly demonstrate the application of circular economy principles. The execution of the 3R approach has, in turn, indirectly demonstrated the application of circular economy principles.

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One of the most populous areas with a fairly large waste problem is the Province of East Java. It has a population of 41.815 million people and generates 16.759.5 tons/day of waste. On the other hand, many recycling industries utilise plastic waste as raw materials for their industry, as well as the growth of community participation in plastic waste through the building of 3.217 Waste banks; therefore, the waste problem in East Java becomes very interesting to discuss further. In reality, much plastic waste can still be found in the rivers and beaches of East Java. For instance, last September, volunteers from World Clean Up Day collected 3,400 kg of trash at Talang Siring Beach in Pamekasan. From the inventory results, 12 categories of waste were identified based on plastic producers and types. Straws and plastic bags account for 22%, while sack waste accounts for 41%. Additionally, over 673 illegal buildings along the banks of the Surabaya River contribute to plastic pollution, as their inhabitants often throw garbage directly into the river.

Although the implementation of 3R has developed, the need for raw materials for the plastic industry has special requirements, including plastic quality and continuity of raw materials. Therefore, it is necessary to develop an economic approach to plastic waste, namely from separation, transportation, processing, and utilisation, to form a circular economic ecosystem, so that in addition to being able to overcome the problem of plastic waste, it can also meet the raw materials for the plastic industry while empowering the community and increasing community income.

These national policy directions — operationalised through RPJPN 2025–2045 (Law No. 59 of 2024) and RPJMN 2025–2029 (Presidential Regulation No. 12 of 2025) — set ambitious targets including 85% household waste collection coverage and 20% recycling rates by 2029, in alignment with SDG 12 (Responsible Consumption and Production) and SDG 13 (Climate Action). However, a critical legal gap remains: East Java's provincial regulatory framework, particularly Perda No. 9 of 2022, has not been harmonised with these circular economy mandates, resulting in weak enforcement, the absence of criminal sanctions, and no formal legal recognition of the informal waste sector.[7] These reforms aim

[7] Kementerian Lingkungan Hidup dan Kehutanan Republik Indonesia, 'Indonesia Bersih 2029: KLH/BPLH Pacu Pengelolaan Sampah 100%', Kementerian Lingkungan Hidup Dan Kehutanan Republik

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to create an efficient, environmentally friendly, and sustainable waste management system. The program includes three main components: providing waste management services to 100% of households, processing 90% of waste in integrated waste processing facilities (TPST), and disposing of only 10% of waste in sanitary landfills (TPA).[8]

This not only creates more sustainable jobs but also contributes to the growth of a sustainability-based economy. RPJPN, particularly as regulated in Article 2 and Article 5, Paragraph (1) of Law No. 59 of 2024, states that national development goals include fulfilling the need for a sustainable economy through the efficient and equitable use of resources, as well as better environmental management. Therefore, the circular economy principle in plastic waste management supports Indonesia's long-term vision of a more environmentally friendly and sustainable future.

At the RPJMN 2025–2029 level, the regulation of the circular economy is affirmed through an operational, measurable policy framework. Its normative legal basis is affirmed in Presidential Regulation No. 12 of 2025, Article 2, paragraphs (1) and (6), which designates the RPJMN as the elaboration of the RPJPN, including the priority of plastic waste management based on circular-economy principles to realise a greener, more sustainable economy. The RPJMN sets national targets for waste management (service coverage, treatment rates, recycling, leakage reduction, and residuals) and translates them into the following policy instruments:

(i) Regulatory instruments: expansion of extended producer responsibility (EPR), design standards to make products easier to recycle, recycled-content requirements, labeling/standardisation of secondary material quality, and green public procurement;

Indonesia, 2025, https://kemenlh.go.id/news/detail/indonesia-bersih-2029-klhbplh-pacu-pengelolaan-sampah-100.

[8] Badan Perencanaan Pembangunan Nasional (Bappenas), 'Indonesia-AS Dukung Reformasi Pengelolaan Sampah Nasional Tingkatkan Kesehatan Masyarakat Dan Keberlanjutan Lingkungan', Bappenas, 2024, https://www.bappenas.go.id/id/berita/indonesia-as-dukung-reformasi-pengelolaan-sampah-nasional-tingkatkan-kesehatan-masyarakat-dan-keberlanjutan-lingkungan-Vf6Uo.

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(ii) Economic instruments: incentives and disincentives that align prices with environmental impacts (including reforms to service tariffs and tipping fees), performance-based fiscal transfers to local governments, public–private partnership schemes (PPP) and green financing;

(iii) Governance: clear allocation of roles for ministries/agencies and local governments, mandatory local plans, strengthened enforcement against illegal disposal, and the integration of urban and coastal management to control plastic leakage;

(iv) Infrastructure and operations: source separation, expansion of networks of material/organic recovery facilities, composting and anaerobic digestion, and the use of RDF/WtE for non-recyclable residues, accompanied by landfill modernisation;

(v) Secondary materials markets: development of supply chains and demand certainty through quality standards and demand-side incentives;

(vi) Social inclusion and behaviour change: nationwide education programs and the progressive formalisation of informal waste workers; and

(vii) Data, monitoring, and evaluation: material flow tracking systems and annual reporting of performance indicators to enable policy course corrections.

In addition, it is also important to note that the projection of GHG emission level by 2030 from waste sector is 256 MTon CO_2 eq (13,1%) with CM1 or 253 MTon CO_2 eq (15,5%) with CM2 scenario in Indonesia, meanwhile the target GHG emission reduction 40 MTon CO_2 eq (1,4%) with CM1 or 43,5 MTon CO_2 eq (1,5%) with CM2 scenario. It is also necessary to note that waste contributes 198 Mtones CO2eq (15,9%) of total GHG emissions in Indonesia by 2030, and is one of the targets for reducing GHG in the Nationally Determined Contribution (NDC) by 2060, which is as much as 87 Mtones CO_2eq. CM1 means a mitigation scenario and considers sectoral development targets (unconditionally), while CM2 is an ambitious mitigation scenario with international support available (conditionally).

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This regulatory inertia represents a significant legal gap that this study seeks to address. The normative framework—comprising Law No. 18 of 2008, Government Regulation No. 81 of 2012, and East Java Provincial Regulation No. 9 of 2022—has yet to operationalise circular economy principles systematically, nor does it provide adequate enforcement mechanisms or legal recognition for the informal waste sector. From the perspective of contemporary Islamic law, this failure to manage plastic waste comprehensively is at odds with the maqāṣid al-sharīʿah imperative of environmental preservation (ḥifẓ al-bīʿah). Against this background, this study addresses two central questions: (1) What regulatory gaps exist in East Java's plastic waste legal framework that impede the systematic application of circular economy principles? (2) What legal reform model, informed by a contemporary Islamic law perspective, can effectively bridge these gaps to support sustainable development goals?

METHOD

This research employs a normative legal research method, also known as doctrinal legal research, which is supported by empirical data. Normative legal research is intended to find legal rules, legal principles, and various legal doctrines to answer various legal issues at hand.[9] The normative or library-based legal research used in this thesis also includes: a) Research on legal principles; b) Research on legal systems; c) Research on the level of vertical and horizontal synchronisation; d) Legal history; and e) Comparative law.[10] Normative research also seeks truth through the logic of legal science, examining the foundations of rules and legislation concerning the issues being addressed.[11]

This research analyses regulations governing plastic waste management in Indonesia, particularly in East Java. Using a normative approach, this research examines the legal bases governing plastic waste management and the implementation of circular

[9] Peter Mahmud Marzuki, 'Penelitian Hukum, Prenada Media Group, Jakarta, 2005', *Edisi Pertama, Cetakan Ke-7 November*, 2011.
[10] Soerjono Soekanto, *Pengantar Penelitian Hukum*, in *UI Press, Jakarta* (2006).
[11] J. Ibrahim, 'Teori Dan Metode Penelitian Hukum Normatif Bayu Media', preprint, Surabaya, 2015.

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economy principles, which remain suboptimal in Indonesia. Through a legislative approach, this research will analyse relevant regulations, including Law Number 18 of 2008 concerning Waste Management and Government Regulation Number 81 of 2012 concerning Household Waste Management and Household Liked-Waste Management. It will evaluate their implementation in the context of plastic waste management in East Java. Furthermore, the conceptual approach will be used to explore the circular economy and the 3R principles (reduce, reuse, recycle) in plastic waste management, to understand their application in Indonesia and their alignment with existing regulations. The Historical Approach will trace the development of plastic waste management regulations from early policies to the present, including an analysis of the obstacles in implementing circular economy principles. Finally, the Comparative Approach will compare plastic waste management practices in East Java with other regions and states that have successfully implemented a circular economy to identify lessons that can be applied to improve the effectiveness of plastic waste management in Indonesia. To strengthen the analysis in this research, it will draw on actual data to support a comprehensive examination of the issues under discussion. Operationally: (1) the legislative approach is applied by mapping and evaluating the vertical synchronisation of national regulations (Law No. 18/2008, PP No. 81/2012, Perpres No. 83/2018) against East Java's Perda No. 9/2022, identifying gaps in circular economy operationalisation and sanction adequacy; (2) the conceptual approach frames circular economy principles — reduce, reuse, recycle, recover, repair — as the analytical benchmark against which existing legal provisions are assessed; (3) the comparative approach draws on circular economy governance models from Germany, China, and Japan to identify legally adaptable reform instruments for East Java's provincial framework; and (4) empirical data on waste generation, recycling infrastructure, and import dependency are integrated not as standalone statistics but as evidence of regulatory failure, directly informing the gap analysis and reform proposals developed in the discussion.

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RESULTS AND DISCUSSION

Review of the Effectiveness of Regulations related to Plastic Waste Management in East Java

Indonesia has several laws and regulations that are correlated and directly related to waste management, namely Law Number 32 of 2009 concerning Environmental Protection and Management, Law Number 23 of 2014 concerning Regional Government, Law Number 18 of 2008 concerning Waste Management, and also several Government Regulations, including Government Regulations Number 81 Year 2002 concerning Household Waste Management and Household Liked-Waste Management and several regional regulations that local governments have established.[12] Law Number 32 of 2009 does not directly regulate waste management. However, Article 3 of Law Number 32 of 2009 provides a framework for environmental protection and management in Indonesia. This article emphasises the importance of preserving the environment to protect the Unitary State of the Republic of Indonesia from pollution and environmental damage, as well as to ensure the safety, health, and lives of humans. An important aspect of environmental protection and management is waste management. Waste can have negative impacts on health and the environment if not managed properly and disposed of in the wrong locations.[13] Proper waste management significantly contributes to achieving the goals outlined in Article 3 of Law Number 32 of 2009, as well as Indonesia's commitment to reducing GHG emissions from the waste sector through the Nationally Determined Contribution (NDC) by 2060, which is set at 1,5%.

The RPJPN 2025–2045 not only sets the general direction but also establishes a transformation framework that positions the circular economy and waste management as cross-sector priorities to achieve the Golden Indonesia 2045 vision: quality growth,

[12] A. E. Kusuma, 'Efektivitas Penegakan Hukum Dalam Bidang Pengelolaan Sampah Pada Kawasan Wisata Religi Banten Lama Berdasarkan Peraturan Daerah Kota Serang Nomor 7 Tahun 2021 Tentang Pengelolaan Sampah', *Senaskah: Seminar Nasional Komunikasi Administrasi Negara Dan Hukum* 1 (2023): 253–262.

[13] Rosita Candrakirana, 'Penegakan Hukum Lingkungan Dalam Bidang Pengelolaan Sampah Sebagai Perwujudan Prinsip Good Environmental Governance Di Kota Surakarta', *Yustisia* 4, no. 3 (2015): 581–601.

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environmental resilience, and industrial competitiveness.[14] Although it does not include a dedicated chapter on plastic waste, the RPJPN affirms a paradigm shift from "collect, transport, dispose" toward life-cycle-based resource management (eco-design, cleaner production, sustainable consumption, segregation, processing, and secondary materials markets). This policy direction is mainstreamed into industrial policy (design standards and recycled-content requirements, expansion of extended producer responsibility/EPR, and green public procurement), fiscal policy (incentives and disincentives that align prices with environmental impacts), urban systems planning (source separation, networks of material/organic recovery facilities, and modern landfill governance)[15], as well as coastal marine governance (controlling waste leakage into water bodies and coastal ecosystems).

Operationalising these directions in RPJPN 2025-2045, the RPJMN 2025-2029 sets the following waste management targets at the national level:

a) 85% of households receive waste collection services by 2029;
b) 38% of generated waste is processed at treatment facilities by 2029;
c) 20% of waste is recycled by 2029;
d) the share of waste leaking into the environment declines to 16% by 2029 (from a 23% baseline in 2022);
e) residual waste disposed to LUR/TPA declines to 47% by 2029.

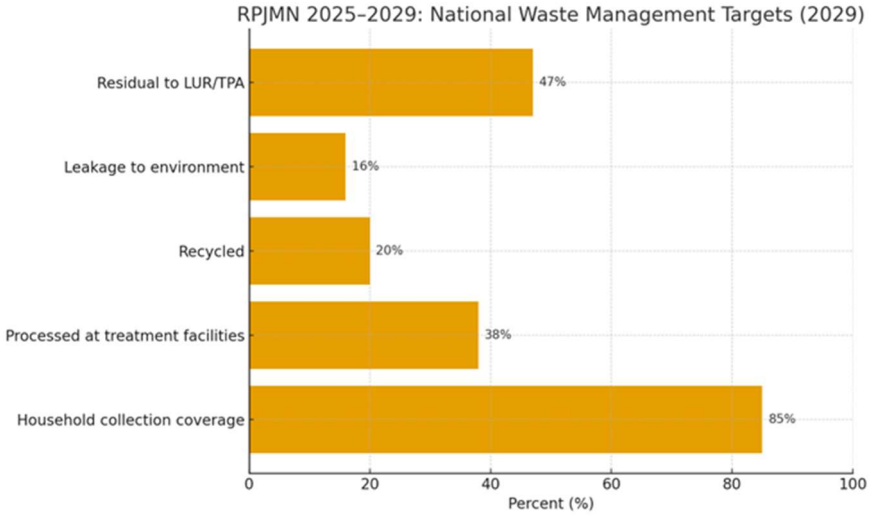
As illustrated in the chart below, the 2025–2029 RPJMN operationalises the direction of the 2025–2045 RPJPN through national waste-management targets for achievement by 2029:

[14] Hidayat Darussalam et al., 'Integrating Sharia Economic Law and the Green Economy in Nature-Based Ecotourism for Local Community Development', *Nusantara: Journal of Law Studies* 5, no. 1 (May 2026): 509–526, https://doi.org/10.66325/nusantaralaw.v5i1.195.

[15] Kartina Pakpahan et al., 'Wildlife Poaching: An Environmental Law Analysis of Transnational Organized Crime Networks', *Nusantara: Journal of Law Studies* 5, no. 1 (March 2026): 171–186, https://doi.org/10.66325/nusantaralaw.v5i1.36.

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Figure 2. Operationalising the RPJPN 2025–2045: RPJMN 2025–2029 Waste Target



Data Source: Author's compilation based on RPJMN 2025–2029 and RPJPN 2025–2045 (Government of Indonesia, 2025)

These targets are part of Indonesia's broader commitment to addressing the waste management crisis, particularly in urban areas where most waste is generated. Waste management in cities has become a critical issue as Indonesia's rapid urbanisation continues, leading to increased volumes and greater complexity of waste generated. To meet these targets, the government has focused on enhancing infrastructure, promoting public awareness, and increasing the efficiency of waste collection and disposal systems. A key aspect of this plan is integrating sustainable waste management practices, including recycling and waste-to-energy initiatives.

To achieve these targets, the government emphasises strengthening infrastructure and governance, behaviour change (source separation), and improving the efficiency of collection–transport–treatment systems. The utilisation of waste-to-energy (WtE) and RDF technologies is affirmed as part of the RPJMN 2025–2029 policy package, in line with the directive to accelerate the resolution of waste issues before 2029. In addition, the government is preparing steps to require producers to recycle plastic (strengthening producer responsibility) in stages through 2029.

Moreover, RPJMN 2025-2029 highlights the importance of adopting a more circular approach to waste management, encompassing not only waste reduction but also

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improving waste processing through recycling and reusing materials. The concept of a circular economy is integral to achieving these targets, as it not only reduces waste but also maximises resource efficiency. By promoting recycling, particularly of plastic waste, Indonesia aims to significantly reduce the environmental impact of waste disposal while creating new economic opportunities in the recycling and waste management sectors. This aligns with the national goals of reducing reliance on landfills, minimising plastic pollution, and better use of existing resources.

In the RPJMN 2025-2029, Indonesia's government has placed strong emphasis on transitioning to a circular economy, which will be key to enhancing sustainability and achieving targets for waste management. These plans also directly contribute to Sustainable Development Goal 12 (Responsible Consumption and Production), which calls for sustainable management of waste and reduction of its environmental impact. By prioritising waste management in these development plans, Indonesia is taking significant steps towards a more sustainable future, focusing on improving urban infrastructure, increasing recycling rates, and supporting a circular economy that minimises plastic waste and promotes resource efficiency.

The plan also includes measures to control environmental pollution, including the management of plastic waste. Currently, it is estimated that around 0.7 million tonnes of plastic waste are released into the ocean each year.[16] Inevitably, the use of plastic bags in daily life is increasing, resulting in society's growing dependence on plastics. This occurs because plastic is a practical packaging material that appears clean, is easily accessible, durable, and inexpensive.[17] However, many people are still unaware of the dangers of plastic bags and how to handle them properly. In addition, plastic bags contain carcinogenic substances that can harm living beings if they are continuously exposed to the elements, fire, or combustion.

[16] Iain G. Shuker and Cary Anne Cadman, 'Indonesia - Marine Debris Hotspot Rapid Assessment : Synthesis Report', 2018.

[17] Syamsiar Nurhayadi et al., 'Reconstructing Legal Protection for Construction Service Providers in Construction Contracts Based on Pancasila Justice', *Nusantara: Journal of Law Studies* 5, no. 2 (July 2026): 992–1016, https://doi.org/10.66325/7jwv7550.

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If waste management is not addressed sustainably, it will have a detrimental impact on public health through the emergence of diseases and on the environment through pollution of water, air, and soil. Hayana (2015) said that diseases carried by waste include: Dysentery basilaris, Dysentery amoebica, Cholera, Typhus, Ascariasis, DBD, eye disease, and skin diseases caused by rats and flies. Environmental quality is degraded around the open dumping Final Processing Site, with air pollution from the pungent smell of waste, groundwater contaminated with leachate, and soil mixed with inorganic waste and heavy metals. Plastic bag waste also causes serious problems, including flooding from overflowing rivers in various areas. One negative impact of using plastic bags is that they do not decompose quickly, which can pollute the soil. The accumulation of plastic bags on the ground also creates breeding grounds for mosquitoes, which can lead to various diseases in humans and reduce the quality of clean water.[18]

The population of cities on Java Island produces approximately 189,349 tons of plastic waste every month. Of that total, only 11.83% was successfully collected by upstream actors and Waste Bank Initiatives (WBI). Up to 88.17% of plastic waste is either disposed of directly in landfills without undergoing the recycling process or remains uncollected and unmanaged, both of which are detrimental to the environment. Most of the plastics we use daily, including rigid plastics (such as water bottles, plastic cups, household item bottles, and helmets) and flexible plastics (such as plastic film and plastic bags), are collected by the informal sector. Collectors are often particular about the types of plastic they gather; some collect only rigid or flexible plastic, while others collect both, depending on market needs. Studies show that the most commonly collected types of plastic include rigid Polypropylene (25%), High-Density Polyethene film (20%), Polyethene Terephthalate rigid (20%), High-Density Polyethene rigid (14%), and Polypropylene film (9%).[19]

[18] Kementerian Lingkungan Hidup dan Kehutanan, 'Mengurangi Penggunaan Tas Belanja Plastik Sekali Pakai', Ditjen PPKL-KEMENLHK, 2018, https://ppkl.menlhk.go.id/website/reduksiplastik/02_doc.php.

[19] Nurdiana Darus et al., 'An Overview of Plastic Waste Recycling in the Urban Areas of Java Island in Indonesia', *Journal of Environmental Science and Sustainable Development* 3, no. 2 (2020): 402–415, https://doi.org/https://doi.org/10.7454/jessd.v3i2.1073.

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Waste collectors play a crucial role in the collection process because they can collect plastic in much larger quantities than other actors.[20] The Indonesian Scavenger Association (IPI) estimates that there are around 25,000 operations, and based on this estimate, the number of waste collectors in Java was also calculated. They collect around 22,395 tons of plastic waste each month, which accounts for 9.78% of the total plastic collected on the island of Java. This result shows that, although waste collectors are informal actors, their contributions to the success and sustainability of plastic recycling are very significant.[21] Therefore, it is important to encourage their active involvement in creating a society that is responsible for plastic use.

The East Java Provincial Government plays a strategic role in waste management, particularly concerning the handling of waste at Landfills (TPA) or Integrated Waste Processing Sites (TPST) at the regional level. Under Law No. 23 of 2014 concerning Regional Government, provincial governments' authority in the waste management sub-sector includes the management of regional facilities serving multiple districts/cities simultaneously. The TPA/TPST regional facility is becoming one of the keys to more effective and efficient waste management efforts in East Java, as it allows for waste handling on a larger and more integrated scale.

Law No. 18 of 2008 on Waste Management comprehensively regulates waste management, encompassing the authority and responsibilities of both the central and local governments. Law No. 18 of 2008 regulates waste management by involving both the central government and local governments. Article 5 of Law No. 18 of 2008 emphasises that the government and local governments have the duty to ensure the proper and environmentally conscious implementation of waste management. This means that both levels of government must collaborate to ensure that the waste management system operates in accordance with the objectives set out in this law. Article 6 of Law No. 18 of 2008 on

[20] Siwi Peni et al., 'The Governance of Digital Yield in Indonesian Sugar Partnerships: Integrating Procedural Justice with Contemporary Islamic Economic Law', *MILRev: Metro Islamic Law Review* 5, no. 2 (July 2026): 1138–1156, https://doi.org/10.32332/milrev.v5i2.13150.

[21] Mana Kakinuma, 'Behind the Trash: A Qualitative Research on How Trash Pickers in Cirendeu Area Contribute to Recycling', *Journal of Environmental Science and Sustainable Development* 2, no. 2 (2019): 80–88, https://doi.org/10.7454/jessd.v2i2.1023.

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Waste Management outlines the duties that must be carried out by the government and local governments to achieve effective and sustainable waste management goals, namely:

a. To foster and enhance public awareness in waste management;
b. Conducting research, developing waste reduction technologies, and managing waste;
c. Facilitating, developing, and implementing efforts in waste reduction, management, and utilisation;
d. Implementing waste management and facilitating the provision of infrastructure and facilities for waste management;
e. Encouraging and facilitating the development of benefits from waste processing;
f. Facilitating the implementation of specific local technologies that are being developed within the community to reduce and manage waste; and
g. To coordinate among government agencies, the community, and the business sector to ensure integration in waste management.

Law No. 18 of 2008 on Waste Management stipulates that establishing national waste management policies and strategies is the authority of the central government. However, local governments are also authorised to establish waste management strategies and policies in their respective regions as a form of regional autonomy, while still adhering to regulations and policies at the level above. The district/city policies and strategies must be formulated with reference to provincial policies, which in turn must be based on national policies. Under Law No. 18 of 2008, the central and provincial governments play a greater role in guiding district/city governments in waste management. This was reiterated in Government Regulation No. 81 of 2012 concerning the management of household waste and similar household waste.

The East Java Provincial Government has established a Regional Regulation on Regional Waste Management, East Java Provincial Regulation Number 9 of 2022. This regulation is created as a guideline for waste management implementation in the East Java region. The main goal is to reduce the negative impacts of waste and to improve public health and environmental quality. With this regulation, the East Java Provincial

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Government aims to create a more effective and sustainable waste management system. These steps include reducing waste, improving public health and environmental quality, and changing community behaviour regarding waste. Additionally, this regulation encourages active participation from various parties, including the government, the community, and the private sector, to support effective, environmentally friendly waste management.

Several indicators used to measure the success of waste management goals in Indonesia, as quoted from Indonesian Waste Statistics, include the number of residents served, the level of waste collection services provided by local governments, and technical aspects of landfills (Number of landfills, service period, facilities and monitoring of leachate and methane gas, and waste processing at the landfill). When referring to the purpose of waste management according to Law No. 18 of 2008 on Waste Management, it becomes apparent that waste management is still viewed solely as the government's responsibility and has not yet become a shared responsibility. One cause of this issue is the inadequacy of legal regulations governing community participation in waste management, which contributes to the inefficiency of waste management in Indonesia.[22]

Community participation in waste management is vital for achieving successful, sustainable outcomes. Without community involvement, waste management tends to be inefficient and falls solely to the government. Community awareness and participation can reduce waste, improve environmental quality, and change waste management behaviours. This also supports the government's efforts in providing better waste management facilities and technology. Collaborative participation is essential to fostering a clean and healthy environment for all.

Plastic, as a product that is always connected to daily life, has many functions. However, the use of single-use plastics can lead to dependency and have serious

[22] Norsita Agustina, Hilda Irianty, and Nova Tri Wahyudi, 'Hubungan Karakteristik Petugas Kebersihan Dengan Pengelolaan Sampah Di Puskesmas Kota Banjarbaru', *Jurnal Publikasi Kesehatan Masyarakat Indonesia* 4, no. 2 (2017).

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environmental impacts.[23] For a moment, we can review the practices of Surabaya City, one of the cities in East Java. To reduce waste generation in Surabaya City, the Surabaya City Government has issued several policies. Considering the risks posed by plastic bags, the Surabaya City Government has issued Regional Regulation Number 1 of 2019. To reduce waste generation in Surabaya, the Surabaya City Government has implemented several policies. Plastic, as a product that is always connected to daily life, has many functions. However, the use of single-use plastics can lead to dependency and have serious environmental impacts. Considering the risks posed by plastic bags, the Surabaya City Government has issued Regional Regulation Number 1 of 2019, which amends Regional Regulation Number 5 of 2014 concerning Waste Management and City Cleanliness in Surabaya as a measure to reduce waste. The regulation states that to reduce waste generation, local governments are authorised to establish policies that limit the use of packaging and plastic bags made from materials that are difficult to decompose naturally. Therefore, on March 9, 2022, the Mayor of Surabaya issued Mayor Regulation Number 16 of 2022 concerning the reduction of plastic bag use. As a result of the regulation, the government has banned the use of plastic bags in shopping centres, supermarkets, markets, and restaurants. This policy is expected to reduce single-use plastic consumption.[24] Both regulations issued by the Surabaya City Government outline the steps taken to reduce plastic waste in the area.

According to Surabaya Mayor's Regulation Number 16 of 2022 on reducing plastic bag use, the use of plastic bags is prohibited, while the use of environmentally friendly shopping bags is mandatory. Eco-friendly shopping bags are made from natural materials and can be reused without losing quality. This regulation aims to reduce waste from non-biodegradable plastic bags, address pollution, and support environmental protection efforts. The reduction of plastic bag usage is implemented through a ban on plastic bags

[23] Ferlita Salsabila Dwiyanti, Linda Nirmalasari, and Revienda Anita Fitrie, 'Proses Pengambilan Keputusan Pemerintah Surabaya Dalam Menangani Peningkatan Penggunaan Plastik Di Surabaya', *Jurnal Media Akademik (JMA)* 2, no. 5 (2024).

[24] Salsabila Mawardani and Lukman Arif, 'Program Pengurangan Penggunaan Kantong Plastik Di Pasar Pucang Anom Kota Surabaya Dalam Pandangan Teori Implementasi Kebijakan', *Journal Publicuho* 6, no. 2 (2023): 560–567, https://doi.org/10.35817/publicuho.v6i2.158.

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and the requirement to use environmentally friendly shopping bags in shopping centres, markets, supermarkets, and restaurants.[25]

To support the implementation of this regulation, a plastic-free market program is being conducted in public markets. The program was initiated by the Zero Waste Community and the Indonesian Plastic Bag Diet Movement, supported by the Surabaya City Government. To reduce the use of single-use plastic bags in traditional markets, the Zero Waste Community of Surabaya, in collaboration with the Gerakan Indonesia Diet Kantong Plastik (GIDKP), is implementing the Plastic-Free Market Program. This program is also being implemented in several cities, such as Bogor, Banjarmasin, Bandung, Denpasar, and Surabaya. In Surabaya, the Plastic-Free Market Program is being implemented at Citraland Fresh Market. The activities include preparing Standard Operating Procedures (SOPs) for plastic-free markets in collaboration with traders and market managers. These SOPs guide market traders on interacting with consumers, including two alternative options for plastic packaging. The first option is not to provide customers with bags for those who do not bring their own containers or eco-friendly bags. The second option is to suggest to customers who do not bring containers to purchase shopping bags at the nearest stall.[26]

All of these policies related to plastic use and management demonstrate an effort to minimise plastic waste. However, seeing the benefits of plastic in everyday life, it is certainly impossible to completely remove plastic from human life. On that basis, the discussion in the next section will lead to efforts to make plastic waste have economic value through the application of circular economy principles.

[25] Maise Ismandar and Kaheesha Zalfa Rohadatul'Aisy, 'Pengambilan Keputusan Tas Belanja Untuk Mengurangi Sampah Plastik Di Surabaya', *Jurnal Media Akademik (JMA)* 2, no. 5 (2024), https://doi.org/10.62281/v2i5.324.

[26] 'Launching Program Pasar Bebas Plastik Di Citraland Fresh Market Surabaya', Plasticdiet.Id, 2022, https://plasticdiet.id/launching-program-pasasr-bebas-plastik-di-citraland-fresh-market-surabaya/.

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The Urgency of Good Plastic Waste Management in East Java

Waste management in East Java is currently facing an emergency. This issue is marked by the increasing volume of waste generated, the lack of adequate management facilities, and the still low public awareness regarding proper waste management. With increasing waste, many landfills are already full, leading to poor waste management. This has the potential to create more serious environmental problems, such as soil and water pollution, and to increase health risks for the community. To address this issue, concrete steps from the government and active participation from the community are needed in the reduction, management, and utilisation of waste.[27] Karyadi explains that waste generation refers to the amount of waste produced by the community measured in volume or weight per capita per day, or due to building expansion or road extension.[28] Waste generation can be determined by conducting sampling based on established standards expressed in weight units (kg/person/day) and volume units (L/person/day). The magnitude of this waste generation requires reduction and management; indirectly, waste management is related to the reduction and handling of waste at its source, the community.[29]

On the other hand, 8 plastic industries in East Java require 15,778 tons of recycled plastic raw materials with a maximum impurity of 2%, or approximately 315.56 tons. This means that there are an additional 315.56 tons/year of plastic waste coming from plastic import activities. Therefore, the import of plastic materials should be avoided. In an effort to reduce waste, the East Java Provincial Government has issued Regulation Number 9 of 2022 on Regional Waste Management. This regulation serves as a guideline for waste management implementation in the East Java region, with the main goal of reducing the

[27] Nabila Zahra Nur Aminah and Adina Muliawati, 'Pengelolaan Sampah Dalam Konteks Pembangunan Berkelanjutan (Waste Management in the Context of Waste Management)', Hmgp.Geo, 2021, https://hmgp.geo.ugm.ac.id/2021/08/27/pengelolaan-sampah-dalam-konteks-pembangunan-berkelanjutan-waste-management-in-the-context-of-waste-management/.

[28] Difla Nadjih, Sujarwo Saputro, and Mukhlas Madani, 'Identifikasi Jumlah Dan Faktor Timbulan Sampah Di Kawasan Wisata Malioboro', *Nuansa Akademik: Jurnal Pembangunan Masyarakat* 5, no. 1 (2020): 39–52, https://doi.org/10.47200/jnajpm.v5i1.420.

[29] Yunianto Setiawan, Searphin Nugroho, and Anggun Dwi Cahya Dani Saputri, 'Analisis Timbulan Dan Komposisi Sampah Perumahan Kecamatan Muara Badak Dihubungkan Dengan Tingkat Pendidikan, Pendapatan, Dan Perilaku Masyarakat', *Jurnal Teknologi Lingkungan UNMUL* 6, no. 1 (2022): 44–48, http://dx.doi.org/10.30872/jtlunmul.v6i1.8478.

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negative impacts of waste and improving health and environmental quality. Through regional regulations, efforts are being made to reduce the accumulation of plastic waste through reduce, reuse, and recycle. The East Java Provincial Regulation Number 9 of 2022 concerning regional waste management faces various obstacles in its implementation. In substance, the East Java Provincial Regulation Number 9 of 2022 on Regional Waste Management imposes administrative sanctions on legal entities that violate its provisions on waste management. This regulation does not include criminal sanctions for legal entities that engage in waste management activities. Reliance solely on administrative sanctions raises serious questions about the adequacy and proportionality of deterrence. Administrative sanctions—such as warnings, permit suspensions, or fines—are insufficient to address large-scale illegal waste disposal by corporations or industrial actors, particularly given the limited monitoring capacity of regional environmental agencies. A comparative analysis with Law No. 32 of 2009 on Environmental Protection and Management, which provides criminal sanctions, including imprisonment, reveals a downgrade in enforcement stringency at the provincial level. This vertical desynchronisation between national and provincial law constitutes a structural weakness that requires legislative amendment to Perda No. 9/2022, specifically by including criminal liability provisions and mandatory environmental audits for waste-generating industries.

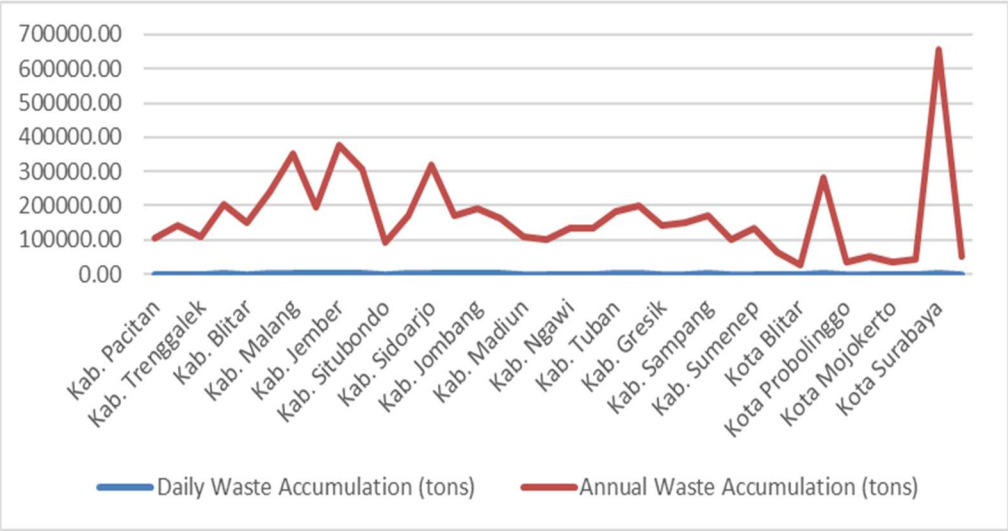
Based on data from the National Waste Management Information System, in 2023, the daily waste generation (in tons) in East Java reached 15,727.79, and the annual waste generation (in tons) reached 5,740,642.79. Compared with other provinces with similar population compositions, West Java can serve as a point of comparison. According to data released by the Directorate General of Population and Civil Registration (Dukcapil) of the Ministry of Home Affairs, the population of East Java Province was 41.64 million as of December 2023, while the population of West Java Province was 49.9 million, according to the same source. However, the amount of waste generated in East Java exceeds that in West Java, despite West Java having a larger population. Based on data from the National Waste Management Information System, in 2023, the daily waste generation (in tons) in

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West Java reached 11,828.71, and the annual waste generation (in tons) reached 4,317,479.97.

The city of Surabaya ranks first in waste generation in East Java, producing 1,800 tons of waste per day in 2023, according to the National Waste Management Information System. (SIPSN, 2023). (SIPSN, 2023). The largest source of that waste is domestic waste, predominantly plastic. Here is the table of the amount of waste generated by districts/cities in East Java. These figures reveal a critical regulatory failure: despite the mandate of Law No. 18 of 2008 and East Java's Perda No. 9 of 2022, waste generation in East Java — a province with a smaller population than West Java — significantly exceeds that of West Java (15,727 tons/day vs 11,828 tons/day). This disparity points not merely to a capacity problem, but to a systemic regulatory inefficiency: the absence of enforceable circular-economy mechanisms, producer responsibility frameworks, and community-level legal obligations within the provincial regulatory architecture.

Figure 3. Waste Accumulation



Data Source: National Waste Management Information System, 2023

In terms of implementation, it indicates that there are still issues with waste management, one of the biggest being the accumulation of plastic waste. Plastic waste is still commonly found on beaches and in rivers across East Java. According to the inventory of the Indonesian River Research Agency (BRUIN), there are at least 12 categories of waste

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based on the companies that produce plastic and the types of plastic they produce. Straws and plastic bags account for 22%, and sachets account for 41%.[30] In addition, there are more than 673 illegal buildings along the banks of the Surabaya River. According to BRUIN, these buildings contribute to plastic waste in the river because people tend to throw it directly into the river.[31] This indicates that the issue of plastic waste has not been adequately addressed at both the individual and corporate levels.

To address this issue, the Mayor of Surabaya, Eri Cahyadi, stated that establishing a Central Waste Bank is expected to promote a circular economy among Surabaya's residents through waste sorting and management. He explained that although waste banks already exist at the sub-district level, it is also important to establish waste banks at the city level so that residents are not confused when they want to sell their waste and do not have to rely on middlemen. With the establishment of city-level waste banks, waste collected at neighbourhood banks will be sent to the sub-district and then to the city level, thereby creating an economic cycle with factories. Eri mentioned that in Surabaya, hundreds of waste banks have been established at the neighbourhood and village levels, but so far the collected waste has only been sold independently by residents. He emphasised the need for an integrated system at the city level and stated that the place for this at the Environmental Agency is already prepared.[32]

The Head of the Environmental Agency (DLH) of Surabaya City, Agus Hebi Djuniantoro, revealed that more than 600 waste banks have now been established in Surabaya City, spread across community units (RWs), villages, school environments, and offices. However, their productivity is still not optimal, with a maximum collection of only 2 tons per day across all waste banks. Hebi explained that most waste bank managers are not scavengers but rather individuals who have received education in waste management. Therefore, he emphasised the need for establishing a central waste bank that will facilitate

[30] Moh Tamimi, 'Penanganan Sampah Di Jawa Timur Masih Buruk', Mongabay, 2023, https://www.mongabay.co.id/2023/11/19/penanganan-sampah-di-jawa-timur-masih-buruk/.
[31] Tamimi.
[32] 'Bank Sampah Induk Bisa Gerakkan Ekonomi Sirkular Warga Surabaya', Dinas Kominfo Jawa Timur, 2023, https://kominfo.jatimprov.go.id/berita/bank-sampah-induk-bisa-gerakkan-ekonomi-sirkular-warga-surabaya.

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all waste banks in Surabaya. This central waste bank will organise the sorting of plastics, bottles, and other materials for administrative recording and be responsible for sales at stable prices. The plan is for the management of the Main Waste Bank to be handled by a third party, while the Surabaya City Government will connect it with waste management companies. They are currently drafting plans to establish a city-level waste bank, aiming to collect at least 5 tons of waste per day. In this case, although there is already a Main Waste Bank in Surabaya, the place needs to be organised to be more representative.[33]

The Mojokerto City Government has established a partnership with Rekosistem, a subsidiary of PT Khazanah Hijau Indonesia, to develop waste management based on a circular economy into energy (waste-to-energy). This collaboration is expected to enhance the economic value for the community and realise a waste-free Mojokerto City. The consortium of Japanese companies comprises Ajinomoto, Marubeni, Panasonic, Unicharm, and Yakult, while Rekosistem is a startup focused on climate tech and the circular economy. These promising public-private initiatives notwithstanding, a critical legal gap persists: waste pickers (pemulung) and waste bank operators — who collectively manage a significant proportion of recyclable plastic in East Java — have no formal legal recognition under either Law No. 18 of 2008 or Perda No. 9 of 2022. Their contributions are absorbed into circular economy outcomes without corresponding legal status, social protection, or institutional integration. From a contemporary Islamic law perspective, this exclusion contradicts the principle of ʿadl (justice) and the maqāṣid imperative of protecting livelihoods (ḥifẓ al-māl). A comprehensive legal reform of Perda No. 9/2022 should therefore incorporate: (1) formal legal recognition of waste banks as circular economy institutions; (2) registration and social protection mechanisms for individual waste pickers; (3) mandatory integration of informal sector actors into district-level waste

[33] Dinas Kominfo Jawa Timur, 'Bank Sampah Induk Bisa Gerakkan Ekonomi Sirkular Warga Surabaya'.

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management plans (JAKSTRADA); and (4) fiscal incentive instruments to strengthen their operational capacity within the circular economy ecosystem.[34]

Although the implementation of circular economy principles in plastic waste management in East Java aims to create sustainable solutions, it still faces several obstacles. Initially, there is a risk of relying on inefficient infrastructure, which may impede recycling and sorting processes, leading to a significant buildup of waste. Secondly, public education and awareness about the importance of waste management and proper recycling practices remain lacking. This can result in the community not participating actively, thus the potential for waste reduction is not achieved. Thirdly, implementing circular economy principles can create unsustainable markets if not balanced with appropriate policies, such as oversight of the prices and quality of recycled products. Without adequate regulations, the sale of recycled products may become unprofitable for waste bank managers, hindering the program's sustainability. Inefficient management processes and uncertainty in implementing new technologies can also lead to new environmental problems, such as pollution generated from the production processes of recycled goods. Ultimately, insufficient collaboration among the government, private sector, and community can result in insufficient support for circular economy initiatives, leading to suboptimal impacts on plastic waste reduction.

Implementing Circular Economy in East Java to Achieve Sustainable Development Goals

In recent years, economists have begun exploring new approaches to economic development that shift away from linear models toward circular ones. This concept emerged in response to the challenges faced in achieving sustainable industrial practices. This approach adopts solutions inspired by natural systems, aiming to use resources more efficiently while reducing environmental impacts.[35] According to the Ministry of Industry of the Republic of Indonesia, the main principles of the circular economy include five

[34] Enggran Eko Budianto, 'Pemkot Mojokerto Gandeng Rekosistem Kelola Sampah Berbasis Ekonomi Sirkular', detikJatim, 2024, https://www.detik.com/jatim/berita/d-7305430/pemkot-mojokerto-gandeng-rekosistem-kelola-sampah-berbasis-ekonomi-sirkular.

[35] Lilin Indrayani, 'Konsep Circular Economy Untuk Mewujudkan Industri Batik Yang Berkelanjutan', *Prosiding Seminar Nasional Industri Kerajinan Dan Batik* 3, no. 1 (2021): 1–3.

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aspects: Reduce, Reuse, Recycle, Recover, and Repair. These principles can be applied by reducing the use of raw materials from nature, optimising the use of reusable materials, utilising recycled materials, recovering materials through recovery processes, or making repairs.[36]

The circular economy aligns with sustainability principles by utilising waste from production processes for reuse, thus minimising the amount of unused goods.[37] The circular economy can be applied across different sectors, including agriculture and industry, engaging both consumers and producers, and contributing to achieving Sustainable Development Goal (SDG) targets—the achievement of zero waste.[38] Based on the explanations provided, the circular economy is an economic development approach that shifts from a linear model to address challenges of industrial sustainability. This concept, inspired by natural systems, aims to use resources more efficiently and to reduce negative environmental impacts. This approach involves consumers and producers and contributes to the SDGs, particularly the achievement of zero waste.

In the green circular economy, sustainability becomes the main focus for practitioners worldwide, including in Indonesia. Globally, the issue of sustainability has been recognised by various world leaders through the "Sustainable Development Goals" (SDGs) established for 2030. In 2015, the SDGs, consisting of 17 targets, were adopted by all UN members as a global step to reduce, or even eliminate, poverty, protect the planet, and ensure that everyone experiences peace and prosperity by 2030.[39] The issue of waste has become a major concern. The Director of Waste Management at the Ministry of Environment and Forestry (KLHK) revealed that 72% of the Indonesian population shows

[36] Kementerian Perindustrian, 'Penerapan Circular Economy Berpotensi Dorong Substitusi Impor Sektor Industri', Kementerian Perindustrian, 2021.
[37] Yuni Mariani Manik, 'Ekonomi Sirkular, Pola Berfikir Dan Pendidikan Untuk Keberlanjutan Ekonomi', *PROMOSI (Jurnal Pendidikan Ekonomi)* 10, no. 1 (2022), http://dx.doi.org/10.24127/pro.v10i1.5418.
[38] Nor Isnaeni Dwi Arista, 'Konsep Ekonomi Sirkular Pada Industri Tekstil Alami: On Farm–Off Farm Budidaya Tarum Sebagai Pewarna Alami', *Agropross: National Conference Proceedings of Agriculture*, 2022, 524–532.
[39] United Nations Development Programme, 'Sustainability Development Goals', UNDP, 2021, www.id.undp.org.

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indifference toward waste issues.[40] This condition is based on the Environmental Indifference Behaviour Index report from the Central Statistics Agency. Society's indifference toward waste leads to serious environmental problems, including littering, accumulation, and spread. Moreover, environmental conditions are worsened by fumes from motor vehicles, industrial emissions, waste burning, freon use, soil and water pollution, and flooding.[41]

In response to the UN Framework Convention on Climate Change, 196 countries have developed strategies to achieve low-carbon development. Among these countries, China, the largest manufacturer and a rapidly growing economy, faces challenges including rapid growth, environmental damage, health impacts from pollution, and issues of social justice. All of this encourages the adoption of new low-carbon strategies, including the implementation of the circular economy concept. The concept of the circular economy emerged in China during the 1990s as a response to economic growth and the limitations of natural resources. The core idea of the Circular Economy is to recycle materials efficiently while balancing economic growth, resource utilisation, and environmental impacts. The concept of circular economy has gained broad acceptance, with support from global organisations such as the European Commission and the Ellen MacArthur Foundation, focusing on areas such as material design and flow assessment.[42]

The concept of the circular economy evolves differently across regions, shaped by their cultural, social, and political contexts. In Germany, the early 1990s saw the introduction of the Circular Economy concept into environmental policy to address the use of raw materials and natural resources and achieve sustainable economic growth. In China, the late 1990s marked the promotion of the ecological industrial park model, while the mid-2000s brought the implementation of the circular economy concept in line with

[40] '72 Persen Masyarakat Indonesia Masih Acuh Tak Acuh Terhadap Sampah', JPNN.Com, 2019, https://m.jpnn.com/news/72-persen-masyarakat-indonesia-masih-acuh-tak-acuh-terhadap-sampah#google_vignette.

[41] Ludwina Harahap and Nurhidayati Dwiningsih, 'Pengenalan Ekonomi Sirkular (Circular Economy) Bagi Masyarakat Umum', *Empowerment: Jurnal Pengabdian Masyarakat* 1, no. 2 (2022): 135–141.

[42] Kiara Winans, Alissa Kendall, and Hui Deng, 'The History and Current Applications of the Circular Economy Concept', *Renewable and Sustainable Energy Reviews* 68 (2017): 825–833.

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Hu Jintao's vision of a "harmonious society." This application focuses on recycling post-consumption waste and developing a closed-loop system based on waste within companies or among various processing groups and consumers. In China, the circular economy is used as a tool for profitable product development, technological innovation, equipment upgrades, and improvements in industrial management. In England, Denmark, Switzerland, and Portugal, the circular economy is primarily applied in waste management, though business models also adopt the concept of circular material use. Several circular economy initiatives aim to enhance consumer responsibility for material use and waste, evident across various regions of Korea and Japan. In North America and Europe, companies are implementing circular-economy measures to enhance reduction, reuse, and recycling programs and to conduct product life-cycle studies. Over the last decade, various top-down approaches, such as material flow analysis, and bottom-up approaches, such as the concept of a harmonious society, have emerged, encompassing circular economy and tools for the quantitative assessment of new circular economy initiatives. In Serbia, research is underway to explore the potential and benefits of new circular-economy initiatives. With the development of circular economy initiatives, various tools for assessing material flows have also evolved, though many do not consider the social or community context in which these initiatives are implemented.[43]

East Java Province has a high population density due to numerous large cities. According to data from the East Java Provincial Environmental Agency, in 2021, the Environmental Quality Index reached 68.49, while in 2022 it increased to 69.92. The data indicates that environmental quality is moderate, which aligns with waste management issues, particularly in Jombang District. The implementation of waste management activities in Jombang District is divided according to each responsible section. The waste management section coordinates with the street cleaning team, garbage collectors, and the Temporary Disposal Site (TPS) guards, while the waste reduction section collaborates with officers at the Jombang Main Waste Bank and the 3R TPS in Jombang District. In 2023, there were positive developments in waste management, with results surpassing the

[43] Winans, Kendall, and Deng.

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Jombang District Environmental Agency's strategic plan targets, reaching 42.55%. Currently, waste management is served by 89 waste collection points/3R waste collection points throughout Jombang District. Several waste management policies and programs that have been implemented include the Jombang Resik Program – Reduksi Sampah Mulai dari Kita (Waste Reduction Starts with Us), Sistem Layanan Pengaduan Penanganan Sampah – SIAPS (Waste Handling Complaint Service System), and TPA SANTRI – Tempat Pembuangan Akhir Sanitary Landfill (Final Disposal Site/Sanitary Landfill).

First, promote the development of 1 village, 1 3R waste management site through funding from the regional budget (Anggaran Pendapatan dan Belanja Daerah/APBD), the national budget (Anggaran Pendapatan dan Belanja Negara/APBN), and budget allocations derived from village revenue expenditures. Second, encourage the development of waste banks by widely implementing innovations, including smart waste cards and the Waste to Charity program (SAJADAH). Third, support community mentoring programs in waste management by enhancing community participation, such as through Adiwiyata (green school) activities for schools, eco-pesantren, and clean villages/climate villages. Fourth, provide support for the infrastructure and operational budget for waste management, including the addition of 3R waste collection points, 15 new containers (bringing the total to 130), and the purchase of one garbage truck unit. Fifth, operate the sanitary landfill with a focus on the safe disposal of waste for the environment.[44]

There are several recent innovations and approaches in implementing the circular economy concept in various countries and regions. The circular economy concept is applied in various ways according to local contexts. For example, in China, it is implemented through the ecological industrial park model and the concept of a harmonious society. Additionally, it is utilised in product development, technological innovation, and industrial management in various countries. In addition, the implementation of the circular economy is also illustrated through a multidimensional approach in waste management, including the development of the 1 village 1 waste management site (TPS

[44] Dedi Yunus, Amni Zarkasyi Rahman, and Retna Hanani, 'Analisis Kelembagaan Pengelolaan Sampah Di Kabupaten Jombang', *Journal of Public Policy and Management Review* 13, no. 2 (2024): 1–20.

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3R), the implementation of innovations such as the Smart Waste Card, and community assistance programs like the Green School Program (namely Adiwiyata and Ecopesantren). The most recent data from the East Java Provincial Environment Agency and the waste management achievements in Jombang District in 2023 provide an up-to-date picture of the developments and effectiveness of waste management strategies at the local level. Technological innovations, such as the use of Smart Cards and the Waste to Charity program (SAJADAH), as well as the addition of infrastructure like containers and garbage trucks, emphasise the application of technology in waste management.

CONCLUSION

This study has identified three structural legal gaps in East Java's plastic waste governance framework that impede the systematic application of circular economy principles. First, East Java's Perda No. 9 of 2022 lacks criminal sanctions, creating a deterrence deficit compared to the national standard set by Law No. 32 of 2009. The reliance on administrative sanctions alone is insufficient to curb large-scale illegal disposal by industrial actors. Second, the provincial framework contains no legal recognition for informal sector actors — waste pickers and waste banks — whose contributions are essential to circular economy outcomes yet remain legally invisible and socially unprotected. Third, there is no systematic regulatory mechanism operationalising circular economy principles — extended producer responsibility, recycled-content mandates, or fiscal incentive structures — at the provincial or municipal level, resulting in a persistent gap between national policy ambition and local regulatory reality. From a contemporary Islamic law perspective, these gaps are inconsistent with the maqāṣid al-sharīʿah imperatives of ḥifẓ al-nafs (protection of life and health), ḥifẓ al-bīʿah (environmental preservation), and ḥifẓ al-māl (protection of livelihoods).

Based on these findings, this study proposes four precise legal reform recommendations. First, amendment of Perda No. 9/2022 to incorporate criminal liability provisions for industrial-scale illegal waste disposal, with sanctions proportionate to environmental damage, aligned with the enforcement framework of Law No. 32 of 2009. Second, formal legal recognition of waste banks as circular economy institutions within the

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provincial regulatory framework, including registration requirements, operational standards, and eligibility for government fiscal transfers. Third, enactment of an Extended Producer Responsibility (EPR) regulation at the provincial level, obligating plastic product manufacturers and importers to bear financial and operational responsibility for post-consumer waste collection and recycling — reducing reliance on government budgets and import dependency for recycled raw materials. Fourth, establish a circular economy integration clause in district-level waste management plans (JAKSTRADA), mandating that all kabupaten/kota in East Java incorporate circular economy indicators, informal sector formalization targets, and recycling infrastructure investment timelines. These reforms would close the vertical synchronisation gap between national circular economy mandates and East Java's provincial governance framework, contributing to SDG 12, SDG 13, and Indonesia's NDC waste sector targets.

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AUTHOR CONTRIBUTIONS STATEMENT

Rosa Vivien Ratnawati conceived the study, developed the research framework, supervised the overall research process, and contributed to the critical revision of the manuscript. Suparto Wijoyo, as the corresponding author, coordinated communication with the journal throughout the submission, peer-review, and publication processes, contributed to the conceptual development of the legal analysis, validated the research findings, provided substantive intellectual input during manuscript revision, and oversaw the integrity of the manuscript throughout the publication process. Rudi Purwono was responsible for the research methodology, formal analysis, data interpretation, and contributed to drafting the initial manuscript. Mas Rahmah participated in data curation,

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investigation, literature review, and validation of the analytical findings. Tyasning Permanasari contributed to data analysis, visualization, manuscript editing, and refinement of the discussion section. Mohammed Salem Ahmed Amayreh contributed to the comparative legal analysis, critically reviewed the manuscript for important intellectual content, enhanced the academic quality of the English language, and participated in the final review prior to submission. All authors reviewed and approved the final version of the manuscript and agreed to be accountable for all aspects of the work.

CONFLICT OF INTEREST

The authors declare that there are no financial, professional, institutional, or personal conflicts of interest that could have influenced the research, authorship, or publication of this article. The authors further affirm that this study was conducted independently and objectively, without any undue influence from external parties.

AI USAGE STATEMENT

The authors declare that artificial intelligence (AI)-assisted tools were used solely to support language refinement, grammar correction, and improvement of the manuscript's readability. AI tools were not used to generate, analyze, interpret, or validate the research data, nor were they involved in developing the study's methodology, findings, or conclusions. All intellectual content, legal analysis, interpretations, and final editorial decisions were developed and critically reviewed by the authors, who accept full responsibility for the accuracy, originality, and integrity of the published work.

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