Electronic Waste Governance in Indonesia: Assigning Stakeholder Responsibility Under the Polluter Pays Principle

Dewi Elvani Lumban Gaol[1*], Ulya Yasmine Prisandani[2]
[1]School of Law and International Studies, Universitas Prasetiya Mulya, 15339, Indonesia
[2]School of Law and International Studies, Universitas Prasetiya Mulya, 15339, Indonesia

Corresponding author's email: 13502210007@student.prasetiyamulya.ac.id

Abstract

In 2021, the Indonesian Ministry of Environment and Forestry recorded approximately two million tons of electronic waste generated nationwide, with less than 20 percent properly managed. According to the World Health Organization, improperly handled electronic waste can become hazardous waste, especially if it contains toxic materials that can affect human health, particularly children and pregnant women. This paper aims to examine the extent to which the Polluter Pays Principle is reflected within Indonesia's current environmental and waste management laws electronic waste management and to identify the responsibility of each stakeholder based on the Polluter Pays Principle. This research uses normative legal methods, analyzes Indonesian environmental legislation, international environmental principles, and academic literature, complemented by interview results with electronic waste practitioners to assess regulatory gaps. The findings reveal that existing regulations only partially incorporate the Polluter Pays Principle and fail to clearly assign responsibilities among stakeholders. Strengthening the explicit incorporation of Polluter Pays Principle in regulations into these regulations can enhance accountability, promote circular economy initiatives, and strengthen Indonesia's transition commitment with international standards. The results of this study are expected to serve as a practical and academic reference for stakeholders, academics, NGOs, and the government in implementing or teaching Polluter Pays Principle implementation for better electronic waste management. The study aims to reinforce Indonesia's transition commitment to be more aligned with the global sustainable practices.

Keywords: Polluter Pays Principle; Electronic Waste Governance; Environmental.

1. Introduction

In 2022, there were more than 62 million tons of electronic waste globally, and that figure is growing by an average of 2 million tons per year [1]. Within Southeast Asia, Indonesia ranks as the largest electronic waste producer, followed by the Philippines and Thailand [2], [3]. Data from the Indonesian Ministry of Environment and Forestry indicate that in 2021, approximately 2 million tons of electronic waste generated nationwide [4], with less than 20 percent properly managed [5].

Improper electronic waste management poses a real threat to the environment and human health [6]. When electronic waste is disposed of inappropriately, hazardous substances can leach into soil and groundwater or be released into the atmosphere [7]. According to the World Health Organization, inadequately handled electronic waste can

become hazardous waste, particularly due to the presence of toxic materials that can affect human health, especially children and pregnant women [1].

Despite posing serious threats to both human health and the environment, also being recognized as the fastest-growing type of waste, electronic waste management policies remain largely unimplemented, particularly in developing countries [7]. In Indonesia, there is still no comprehensive legal framework specifically governing electronic waste [8]. Rahmanda *et al*. (2023) stated that although Indonesia has several provisions for managing electronic waste, in general, there are no adequate and comprehensive regulations [8].

A comprehensive review by Attazahri *et al*. (2021) outlines that Indonesia's electronic waste management system lacks integration between formal and informal sectors [9]. Their paper reveals that collaboration among stakeholders could serve as a potential solution to improve electronic waste management. Similarly, Amalia *et al.* (2021) found that despite the rapid growth of electronic waste generation, Indonesia's utilization and control measures are still ineffective due to weak public awareness and absence of enforcement mechanisms [10]. Meanwhile, from a legal and policy perspective, Zulkarnaen *et al*. (2023) highlight the urgency of enacting an Electronic Waste Management Law, emphasizing that current regulations related to electronic waste do not adequately reflect the principles of Extended Producer Responsibility (EPR) [11]. Raharjo and Utomo (2021) observe that electronic waste management has not yet become a major issue and even lags far behind developed countries, such as the United States, Japan, and Switzerland [12]. Their research suggests several technical programs, including the 4R programs (Reduce, Reuse, Recycle, Remove), dropboxes for electronic waste collection, amongst others.

Overall, the aforementioned studies show that Indonesian regulations remain reactive rather than preventive. The primary factor is the lack of comprehensive regulations regarding electronic waste management, including the responsibilities of each stakeholder. In general, few papers examine the legal dimensions related to electronic waste regulatory analysis in Indonesia. This paper will attempt to address this research gap by applying the Polluter Pays Principle as a basis for establishing stakeholder responsibilities in electronic waste management in Indonesia.

From the background presented above, this paper will answer two research questions, namely:

1. To what extent does Indonesia's existing environmental legal framework reflect the Polluter Pays Principle in addressing electronic waste?
2. How should electronic waste management responsibilities among stakeholders be regulated based on the Polluter Pays Principle?

The results of this study are expected to serve as a practical and academic reference for stakeholders, academics, NGOs, and the government in implementing or teaching Polluter Pays Principle implementation for better electronic waste management. The study aims to reinforce Indonesia's transition commitment to be more aligned with the global sustainable practices.

2. Method

This research uses normative legal research method. The primary legal sources consist of legislation from Indonesian environmental regulatory frameworks. Secondary sources include legal textbooks, journal articles, and official reports. To complement the normative analysis, this paper also incorporates insights from interview with Muhammad Rafa Ibnu

Sina Jafar, founder of E-WasteRJ [13], a community organization focused on electronic waste management in Indonesia.

The primary Indonesian legal sources analyzed include:

1. Law No. 23 of 1997 concerning Environmental Management;
2. Law No. 18 of 2008 on Waste Management;
3. Law No. 32 of 2009 on Environmental Protection and Management;

Government, Presidential, and Local Regulations:

4. Government Regulation No. 127 of 2020 on Specific Waste Management;
5. Government Regulation No. 22 of 2021 concerning the Implementation of Environmental Protection and Management;
6. Presidential Regulation No. 109/2025 concerning Urban Waste Management Through Processing Waste into Renewable Energy Based on Environmentally Friendly Technology;
7. Governor Regulation No. 77 of 2020 on Waste Management within the Neighborhood Association;
8. Governor Regulation No. 127 of 2020 on the Waste Management Master Plan;
9. Governor Regulation No. 49 of 2021 on the Provision and Utilization of Parks;
10. Governor Regulation No. 95 of 2021 on Technical Standards for Waste Management Infrastructure and Facilities;
11. Instruction of the Governor of Jakarta No. 107 of 2019 on Waste Reduction and Sorting in the Special Capital Region of Jakarta Government Environment;
12. Bontang Regional Regulation No. 11 of 2020 on Waste Management;
13. The Yogyakarta Mayor Regulation No. 32 of 2022 outlines a comprehensive Master Plan for Waste Management;
14. Karawang Regent Regulation No. 39 of 2025 concerning the Master Plan for Waste Management Systems;
15. Depok Mayor Regulation No. 39 of 2024 on the Master Plan for Waste Management;

Environment Protection and Management Regulation from various regions:

16. Blora Regency Regional Regulation No. 2 of 2011;
17. Bogor Regency Regional Regulation No. 6 of 2016;
18. Banyumas Regency Regional Regulation No. 18 of 2014;
19. West Lombok Regency Regional Regulation No. 3 of 2013; and
20. Batang Regency Regional Regulation No. 16 of 2010.

3. Result and Discussion

3.1. Overview of Indonesia's Legal Framework on Electronic waste

1. National Level

The first relevant regulation is Law No. 18 of 2008 on Waste Management ("Law 18/2008), which serves as the umbrella framework for waste management in Indonesia. This law establishes the statutory basis for managing *sampah spesifik*

(spesific waste).[1] Article 1 number 2 states that specific waste is waste that requires special management due to its nature, concentration, or volume. Article 2 letter 4 of Law 18/2008 further outlines the types of waste that can be classified as specific waste, namely: *sampah mengandung Bahan Berbahaya dan Beracun* / waste containing hazardous and toxic materials ("B3 waste"); waste containing hazardous and toxic waste; waste arising from disasters; building demolition debris; waste that technologically non-processable; or waste that arises irregularly. Article 3 dan 5 elaborate the core principles and responsibilities of waste management, assigning both the central and regional governments the duty to ensure a safe, sustainable, and economically valuable waste management system.

More specifically, Article 23 paragraph (1) emphasizes that specific waste management is the responsibility of government. Law 18/2008 also mandates that further provisions on specific waste management will be regulated under government regulations.[2] Concluding the regulation on specific waste, Law 18/2008 also includes criminal provisions. Article 39 paragraph (2) stipulates that any person who imports specific waste into Indonesia faces a maximum prison sentence of twelve years and a maximum fine of five billion rupiah. Although Law 18/2008 does not expressly mention electronic waste, its provisions specific waste provide legal foundation for categorizing electronic waste as waste requiring special management [14].

The second relevant regulation is Government Regulation No. 27 of 2020 on Specific Waste Management ("GR 27/2020"). This regulation classifies B3 waste (previously defined under Law 18/2008) as part specific waste, and explicitly includes unused electronic goods as regulated in Article 5 paragraph (2) letter c. The explanation of this provision explains that the "electronic goods" term in refer to electronic and electrical equipment (usually powered by batteries or electricity), which are no longer used or have been discarded by their owners. This category includes a wide range of goods, including dry batteries, cassette recorders, DVD player antennas, communication devices, personal computers, laptops, lamps, irons, *etc*. Furthermore, the explanation of Article 45 paragraph (1) letter a provides additional examples of B3 waste such as insect repellent packaging, oil packaging, medicine packaging, electrical equipment, and various electronic of household equipment. The provisions in Law 27/2020 adopt a broad approach to defining electronic waste in the hazardous waste category.

The next regulation is Government Regulation No. 22 of 2021 concerning the Implementation of Environmental Protection and Management ("GR 22/2021"), which revokes Government Regulation No. 101 of 2014 concerning the Management of Hazardous and Toxic Waste. Although GR 22/2021 does not explicitly mention electronic waste, it falls under the category of hazardous and toxic waste (as outlined in GR 27/2020), which is comprehensively regulated within the framework of GR 22/2021. First, Article 159 letter b prohibits the discharge of solid waste, sludge, and hazardous and toxic waste into water bodies, thereby covering hazardous

[1] Specific waste is one of three types of waste regulated in Law 18/2008, the other two types being household waste and household-like waste, see Article 2 paragraph 1.

[2] See Article 23 paragraph (2) of Law 18/2008.

components commonly found in used electronic devices. Second, GR 22/2021 sets out detailed technical obligations for all entities handling hazardous and toxic waste, covering storage, packaging, collection, transportation, utilization, and generator responsibilities. These obligations include requirement on facility standards, permitting, prohibitions, operational procedures, and safety protocols to ensure proper handling throughout the lifecycle of hazardous waste.[3] Based on Article 444, this regulation requires all entities involved in the generation, transportation, processing, utilization, or disposal of hazardous waste to implement a documented emergency response system. The purpose of this activity is to handle situations in the event of an environmental incident arising from hazardous waste management. GR 22/2021 establishes a comprehensive and technically detailed framework for hazardous waste management. Therefore, this regulation can serve as the basis for Indonesian regulations for the safe handling, processing, and disposal of electronic waste in the hazardous waste category.

2. Regional Level

At the regional level, several technical regulations also reference electronic waste. In DKI Jakarta province alone, there are four Governor regulations. The first is DKI Jakarta Governor Regulation No. 77 of 2020 on Waste Management within the Neighborhood Association ("GR 77/2020"). This regulation requires Jakarta residents to separate their waste, including B3 waste, as part of community-based waste management.[4] The waste collection schedule lists electronic waste along with B3 waste, biodegradable waste, and residues as being collected every Wednesday. Although electronic waste is mentioned separately from B3 waste, the regulation's waste-sorting table categorize electronic waste as part of B3 waste. The second is Governor Regulation No. 127 of 2020 on the Waste Management Master Plan ("GR 127/2020"). Electronic waste is referenced only once, as one of the seven types of waste that must be sorted in government-owned office buildings.[5]

Jakarta also has Governor Regulation No. 95 of 2021 on Technical Standards for Waste Management Infrastructure and Facilities ("GR 95/2021"). This regulation provides technical standards for waste management facilities, including sorting, collection, transportation, management, and final waste processing. Article 6 specifies that electronic waste, as a form of household B3 waste, must have a designated waste container (*wadah sampah)*.[6] Article 7 letter f further requires special container for electronic waste in offices and schools managed by the DKI Jakarta Provincial Government.

The next regulation is Governor Regulation No. 49 of 2021 on the Provision and Utilization of Parks ("GR 49/2021"). This regulation also only mentions electronic waste once in Article 13 paragraph (2) letter a, which requires parks developed under

[3] See Articles 285-326 of GR 22/2021.

[4] See the Appendix of GR 127/2020.

[5] See Article 9 paragraph (2) letter d, *ibid*.

[6] See Articles 1 number 8 of GR 95/2021, a trash container is a place to store trash in a segregated manner and to determine the type of trash.

the principle of "minimum waste" to provide separate waste, including those for electronic waste. Similar to GR 77/2020, electronic waste is categorized separately from B3 waste.[7] Finally, the province also issued the Instruction of the Governor of Jakarta No. 107 of 2019 on Waste Reduction and Sorting in the Special Capital Region of Jakarta Government Environment ("Jakarta Governor Instruction"). This instruction mandates that all offices, schools, and health facilities act as pioneers in implementing waste reduction, sorting, and provide designated waste containers based on the 3R (Reduce, Reuse, Recycle) principles [15]. Notably, the instruction provides a definitive definition of electronic waste, namely waste from electronic devices, such as cell phones, televisions, computers, cameras, photocopiers, and so on.[8] It also expressly distinguishes electronic waste from B3 waste, which includes such as used air fresheners, bleach, detergents, bathroom cleaners, batteries, syringes, and so on.

Another regional regulation is Bontang Regional Regulation No. 11 of 2020 on Waste Management. Article 6 paragraph (2) letter c mentions unused electronic goods as a category of B3 waste. The Explanation of this article clarifies that such goods refer to electronic/electrical equipment that is no longer used or has been discarded by their its last owner. The regulation further provides examples of electronic and electrical waste, including dry batteries, video cassette recorders, antennas, DVD players, communication devices, personal computers, laptops, stereo systems, faxes. This definition closely mirrors the definition of electronic waste established earlier under GR 27/2020.

The following regulation is the municipal government of Depok, West Java, addresses electronic waste management within its waste planning framework, the Mayor Regulation No. 39 of 2024 on the Master Plan for Waste Management ("Depok Regulation"). Although no single article explicitly mentions electronic waste, the foundation for its regulation lies in defining waste types and setting operational plans. It states that electronic waste falls under category of specific waste, defined as waste requiring special management due to its nature, concentration, or volume.[9] This is further substantiated items as B3 waste, such as batteries, light bulbs, and medical waste. Operational in Depok mandates that B3 waste (which includes several components of electronic waste) follows a specific mechanism, it is collected at Sorted Temporary Disposal Sites (*TPS Terpilah*) and then sent to a designated B3 waste manager, PPLI Cileungsi. Looking forward, the city's operational plan and program phasing include a direct commitment to a Specific Waste Management - study on bulky waste and electronic waste (*Pengelolaan Sampah Spesifik (kajian pengelolaan – sampah besar dan sampah elektronik*) for the medium to long term (2025-2033). Still within the West Java Province, Karawang Regent Regulation No. 39 of 2025 concerning the Master Plan for Waste Management Systems ("Karawang Regulation") outlines the regional waste management strategy systematically with

[7] See Article 13 paragraph (2) letter a of GR 49/2021.

[8] See General Provisions for Waste Sorting of Jakarta Governor Instruction.

[9] See the Appendix of Depok Regulation, Tabel 3.1 Kategori Sampah.

the stakeholder needs.[10] Similar to the previous discussed regulation, the waste categorization framework includes waste as a part of B3 waste, which must be specially sorted and treated. The regulation further details a three-stage implementation of container systems - short, medium, and long term, to support this specialized management approach.[11]

Finally, the last regional regulation is The Yogyakarta Mayor Regulation No. 32 of 2022 outlines a comprehensive Master Plan for Waste Management (2022–2031) ("Yogyakarta Regulation"), which strategically incorporates the management of electronic waste by classifying it as specific waste.[12] The core legal responsibility for managing this waste falls under the Pollution Control Section (*Seksi Pengendalian Pencemaran Lingkungan Hidup)*, covering the execution of B3 waste management in residential areas. Operationally, the Master Plan acknowledges that electronic waste requires a specialized system. It provides that waste-separation facilities—*Tempat Pengolahan Sampah dengan Prinsip 3R*, or abbreviated to TPS3R, must be equipped to receive household B3 waste for further processing. The 10-year plan includes concrete, staged programs: immediately, the city intends to implement a temporary dropbox system for specific waste such as electronic and medical waste at communal sites. For the long term, the strategy involves formal cooperation with producers to manage B3 waste, including electronic waste and spent batteries, a model consistent with Extended Producer Responsibility. Furthermore, the city plans to develop a specific regulation concerning the collection and handling of specific waste, aiming to establish a functional collection system using dropboxes at *Bank Sampah* and Material Recovery Facility. Table 1 below provides the summary of the relevant regulations for electronic waste.

Table 1. Mapping the Relevant Regulations of Electronic Waste

Regulatory Level	**Document**	**Key article**	**Electronic Waste Definition**
Law (*Undang-Undang*)	Law No. 18 of 2008 on Waste Management	a. Article 1 Number 2 b. Article 23 Paragraph (1): c. Article 39 Paragraph (2):	Electronic waste is not expressly mentioned, but the Law provides the legal foundation for categorizing electronic waste as specific waste (due to B3 content) requiring special management.

[10] See Article 2 of Karawang Regulation, Objective and Scope.

[11] See the Appendix, Tabel 2.1 *Kategori Komposisi Sampah*, *ibid*.

[12] See the Appendix of Yogyakarta Regulation, Tabel 6.58 *Strategi Sistem Pemilahan/Pewadahan*.

Government Regulation (*Peraturan Pemerintah*)	Government Regulation No. 127 of 2020 on Specific Waste Management	Article 5 Paragraph (2) Letter c and Explanation	Electronic waste is not explicitly mentioned. It falls under the category of hazardous and B3 waste, which is comprehensively regulated by GR 22/2021. The regulation prohibits the discharge of B3 waste into water bodies , sets out detailed technical obligations and mandates documented emergency response systems for B3 waste management.
	Government Regulation No. 22 of 2021 concerning the Implementation of Environmental Protection and Management	a. Article 159 Letter b b. Articles 285–326	The regulation mandates residents to separate their waste, including B3 waste. The waste-sorting table categorizes electronic waste as part of B3 waste, despite it being listed separately in the collection schedule.
Regional Regulation (DKI Jakarta)	Governor Regulation No. 77 of 2020 on Waste Management within the Neighborhood Association	Appendix	This regulation only references electronic waste as one of the seven types of waste that must be sorted in government-owned office buildings.
	Governor Regulation No. 127 of 2020 on the Waste Management Master Plan	Article 9 Paragraph (2) Letter d	Electronic waste is categorized separately from B3 waste in this regulation. It requires parks based on the "minimum waste" principle to provide separate waste containers, including those for electronic waste.
	Governor Regulation No. 49 of 2021 on the Provision and Utilization of Parks	Article 13 Paragraph (2) Letter a	Electronic waste is explicitly referred to as a form of household B3 waste that requires a designated waste container.
	Governor Regulation No. 95 of 2021 on Technical Standards for Waste Management Infrastructure and Facilities	a. Article 6 b. Article 7	Electronic waste is waste from electronic devices (e.g., cell phones, televisions, computers, cameras). It expressly distinguishes electronic waste from B3 waste (e.g., used air fresheners, detergents, batteries, syringes, and so on). The instruction mandates that offices, schools, and health facilities implement sorting and provide designated containers based on 3R principles.
	Instruction of the Governor of Jakarta No. 107 of 2019 on Waste Reduction and Sorting in the Special Capital Region of Jakarta Government Environment	General Provisions for Waste Sorting	Electronic waste is waste from electronic devices, such as cell phones, televisions, computers, cameras, photocopiers, and so on. (This instruction expressly distinguishes electronic waste from B3 waste).

Regional Regulation (Yogyakarta)	Mayor Regulation No. 32 of 2022 on the Waste Management Master Plan	Appendix: Operational Plans/Strategies	Electronic waste is unused electronic/electrical equipment that is no longer used or has been discarded by its last owner (e.g., dry batteries, PCs, laptops, faxes).
Regional Regulation (Bontang)	Regional Regulation No. 11 of 2020 on Waste Management	Article 6 Paragraph (2) Letter c and Explanation	The waste categorization framework includes waste as a part of B3 waste, which must be specially sorted and treated. The regulation outlines the regional waste management strategy systematically with stakeholder needs and details a three-stage implementation of container systems to support this specialized management approach.
Regional Regulation (Karawang)	Regent Regulation No. 39 of 2025 concerning the Master Plan for Waste Management Systems	a. Article 2 b. Appendix, Tabel 2.1 *Kategori Komposisi Sampah*	Electronic waste is categorized as specific waste, defined as waste requiring special management. This is further substantiated by categorizing items like batteries, light bulbs, and medical waste as B3 waste. B3 waste is collected at "*TPS terpilah*" (Sorted Temporary Disposal Sites) Future Strategy: Operational plans include a direct commitment to a Specific Waste Management - study on bulky waste and electronic waste for the medium to long term (2025-2033).
Regional Regulation (Depok)	Mayor Regulation No. 39 of 2024 on the Master Plan for Waste Management	Appendix	Electronic waste is managed under the category of Specific Waste, with specific strategies (*e.g.*, dropboxes and studies) to manage electronic waste.

From the overview above, it becomes clear that Indonesia's regulatory framework across the national, provincial, and municipal levels remains inconsistent even at the most fundamental stage: defining electronic waste. Although electronic waste is generally subsumed under the broader category of specific waste or B3 waste, each regulation adopts its own terminology, scope, and categorization. As a result, there is still no single, coherent provision that clearly regulates electronic waste and the responsibilities of relevant stakeholders. This is a very different situation if compared to other jurisdictions that have a designated regulation for electronic waste, such as the European Union. The European Commission recently published an evaluation report of the already existing Directive 2012/19/EU on waste electrical and electronic equipment (also known as the "WEEE Directive") [16] to follow up on the recommendation issued in 2023 which aimed to increase the return of used and waste mobile phones, tablets, and laptops [17]. The report addressed clearly the compliance costs for each stakeholders, providing clear requirements for example on EPR for producers. Nevertheless, EPR for e-waste has not yet been implemented decently in Indonesia as it is still in its preparatory stage [18], leading to significant challenges still

prevailing despite best practices from leading companies [19]. In the alternative, Polluter Pays Principle is a well incorporated principle under the Indonesian Environmental Law regime and as such, the authors will further examine the Polluter Pays Principle as a foundational framework for articulating stakeholder responsibilities in Indonesia's electronic waste governance.

3.2. Regulating Stakeholder Responsibilities Based on the Polluter Pays Principle

The Organization for Economic Co-operation and Development ("OECD") through the Recommendation of the Council on OECD Legal Instruments Guiding Principles concerning International Economic Aspects of Environmental Policies (2012) explains that the Polluter Pays Principle means that whoever causes pollution must pay the costs of preventing and controlling it [20]. This principle aims to encourage individuals or companies to be more careful in using limited environmental resources. The OECD further emphasizes that companies should not be granted subsidies to cover their pollution control costs, as this can lead to unfair competition. Practically, the Polluter Pays Principle imposes economic obligations on parties who damage the environment, both in the context of prevention and legal accountability [20].

In line with the OECD definition, Philippe Sands *et al*. in *Principles of International Environmental Law, Third Edition* (2012) p. 228, defines that Polluter Pays Principle establishes that the financial burden of pollution must be borne by the party responsible for causing it [21]. However, both the scope and operational application of this principle remain subject to interpretation, particularly regarding the types of costs to be included and the specific circumstances under which the principle may, in exceptional cases, not apply. Similarly, Luppi *et al*. (2012) in their paper explain that the Polluter Pays Principle's position as a guideline for international environmental policy [22], whereas Faure and Niessen (2006) expand the meaning of "polluter" by arguing that even activities that do not violate standards can still be considered pollution if they generate harmful environmental impacts [23]. Furthermore, they emphasize that limiting compensation sanctions only to unlawful actions is considered unfair and can weaken the incentives for business actors who are reducing their emission levels.

In the Indonesian regulatory context, the Polluter Pays Principle was first stipulated in Article 34 paragraph (1) of Law No. 23 of 1997 concerning Environmental Management ("Law 23/1997"), which essentially states that any activity that results in environmental pollution or damage, thus harming a person or the environment, is required to pay compensation or take certain actions. The Explanation to this article identifies it as an actualization of the Polluter Pays Principle. Under this provision, polluters are not only required to pay compensation but can also be ordered by a judge to take certain actions, such as:

- *installing or repairing waste treatment units so that waste meets specified environmental quality standards;*
- *restoring environmental functions;*
- *eliminating or destroying the causes of environmental pollution and/or damage.*

According to N.H.T Siahaan (2003) in *Hukum Lingkungan dan Ekologi Pembangunan* (*Environmental Law and Development Ecology* [24], the Polluter Pays Principle is also embodied in Article 35 paragraph (1) of Law 23/1997, which stipulates that the person responsible for a

business or activity that has a major impact on the environment and uses or produces hazardous or toxic materials bears absolute responsibility to pay compensation directly and immediately for any pollution or environmental damage that occurs. It is further regulated that the person responsible for a business or activity can be released from the obligation to pay compensation if it can be proven that the pollution that occurs is caused by a natural disaster or war, force majeure beyond human capabilities, or the actions of a third party.[13] If the loss is caused by the actions of a third party, then the third party is responsible for paying compensation.[14]

Law 23/1997 was later revoked by Law No. 32 of 2009 on Environmental Protection and Management ("Law 32/2009"). This law defines the Polluter Pays Principle as the obligation of any party that causes environmental pollution or damage (either directly or through its activities) must be responsible for the costs of environmental restoration.[15] The Polluter Pays Principle is futher implemented in Article 87 (1) on Compensation and Environmental Restoration, which authorizes courts to order polluters to: (i) pay compensation; (ii) install or repair waste processing units to meet quality standards; (iii) restore environmental functions; and (iv) eliminate the causes of environmental pollution or damage.[16]

The implementation of the Polluter Pays Principle is further reinforced in the Explanation of Article 472 paragraph (1) of GR 22/2021, which applies the principle by requiring holders of Environmental Approval to provide an environmental restoration guarantee fund. This fund (such as reclamation guarantees, post-mining guarantees, hazardous waste management insurance, or other relevant instruments) is mandated for the restoration of environmental quality that has been polluted or damaged as a result of the approval holder's activities. This requirement ensuring that the financial burden of environmental restoration is borne by the party whose activities caused the harm. Furthermore, the Polluter Pays Principle is also mentioned in Presidential Regulation No. 109/2025 concerning Urban Waste Management Through Processing Waste into Renewable Energy Based on Environmentally Friendly Technology. Article 2 letter c explains that one of the objectives of the regulation is to encourage waste management practices that adhere to the Polluter Pays Principle, thereby ensuring every individual remains responsible for the waste they produce.

The significance of Polluter Pays Principle (*asas pencemar membayar*) as the basis of environmental protection and management is at least mentioned in the 90 regulations provided in Annex 1 of this paper, despite most of them lacking of a clear standard or requirement in the implementation thereof. The recent Presidential Regulation No. 109 of 2025 explicitly mentions that the Regulation aims to "Promote waste management based on the polluter pays principle, so that each person is responsible for the waste they produce." Furthermore, sampling from the five regional regulations on Environment Protection and Management analyzed in this study, namely Batang Regency Regional Regulation No. 16 of 2010, Blora Regency Regional Regulation No. 2 of 2011, Bogor Regency Regional Regulation

[13] See Article 35 paragraph (2) of Law 23/1997.

[14] See Article 35 paragraph (3) *ibid*.

[15] See Article 2 letter j of Law 32/2009.

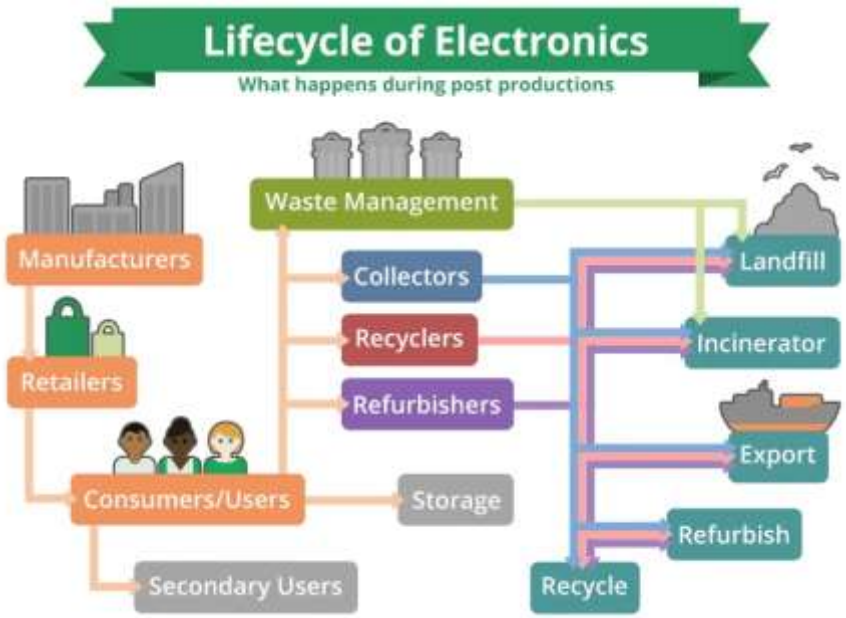
[16] See Article 87 paragraph (1) and the its Explanation, *ibid*.

No. 6 of 2016, Banyumas Regency Regional Regulation No. 18 of 2014, and West Lombok Regency Regional Regulation No. 3 of 2013, all demonstrate consistency with the Polluter Pays Principle as articulated in OECD instruments and international environment law. All five regulations contain provisions that place burden of environmental prevention, control, and restoration on the party responsible for causing pollution or damage. Accordingly, these regional regulatory frameworks align with the core premise of the Polluter Pays Principle: that every polluter must bear the economic consequences of its environmental impacts

The Polluter Pays Principle was also references in an Indonesian court decision, namely Decision No. 249 /Pdt.G/LH/2020/PN Blb [25]. The principle is explicitly addressed through the expert testimony who explained that the Polluter Pays Principle requires any party causing environmental harm to bear the costs of the damage, particularly as environmental protection has become increasingly significant over time. However, the court did not apply the principle due to deficiencies in the plaintiff's formulation of environmental recovery measures and the lack of clearly established causal relationship.

To contextualize these legal and normative principles within the practical reality of electronic waste flows, it is necessary to understand the lifecycle of electronic products. As illustrated in the diagram below, the movement of electronics from manufacturers and retailers to consumers, secondary users, collectors, recyclers, and final waste-management pathways such as landfilling, incineration, recycling, or export. It reveals the multiple points at which environmental risks can arise. This lifecycle view helps clarify which stakeholders generate pollutants at each stage, and consequently, who bears responsibility under the Polluter Pays Principle.

Figure 1. Lifecycle of Electronic Goods
Infographics from e-stewards.org [26]



As showed in the picture above, multiple stakeholders such as manufacturers (producers), retailers, consumers and users, as well as waste management operators all have different roles in the lifecycle of electronics. Table 2 elaborates this lifecycle into a structured

allocation of responsibilities, covering manufacturers, retailers, consumers, formal and informal waste handlers, and government authorities, aiming to explain how the Polluter Pays Principle operates across the entire electronic waste chain.

Table 2. Stakeholder Responsibilites in Electronic Waste Management based on the Polluter Pays Principle.

Stakeholder	**Type of Responsibility**	**Description of Obligations**
Producers / Manufacturers	Primary Financial Responsibility	1. Must bear the economic cost of pollution prevention, collection, recycling, and environmental restoration 2. Must internalize environmental costs rather than externalizing them to the state or public.
	Design & Product Responsibility	1. Expected to design products that are durable, repairable, and recycleable 2. Responsible for reducing hazardous conten at the source
	Liability for Environmental Damage	Required to pay compensation, restore environmental functions, and remove pollution sources if their products cause environmental harm.
Retailers / Distributors	Collection & Take-Back Duty	1. Provide collection points/drop-boxes for electronic waste 2. Educate consumers about proper disposal
	Consumer Information Duty	Provide information on safe disposal procedures a
Consumers	Behavioral Responsibility	1. Must separate electronic waste 2. Avoid improper disposal
	Conditional Liability	If electronic waste is disposed of ilegally or in a manner that causes environmental harm, the consumer become a polluter and therefore bearing responsibility
Formal Waste Management Sector (Licensed Collectors, Transportes, Recyclers)	Operational Responsibility	Must comply with B3 waste handling standards, including storage, transport, treatment, and documentation.
	Liability for Mismanagement	If formal operators mishandle electronic waste and cause contamination, they are considered polluters and must pay for restoration and compensation.
	Emergency & Safety Responsibility	Required to maintain emergency response systems and technical safety protocols for hazardous waste handling.
Informal Waste Management Sector (Scavengers, Small Scrap Dealers, Informal Recyclers)	Actual Polluter Liability	When informal disassembly, burning, or acid-leaching causes contamination, they are polluters and bear responsibility for resulting damage. However a regulatory gap persists, as they often operates unregistered and outside formal oversight. This will make enforcement difficult.
Government (Central & Local)	Regulatory Responsibility	Estasblish Polluter Pays Principle-based legal frameworks, standards, and enforcment mechanisms.
	Supervisory & Enforcement Duty	Ensure producers, retailers, recyclers, and consumers comply with the regulation, investigate, and sanction polluters.
	Facilitator Role	Provide infrastructure (*e.g*. temporary store, TPS3R) and support public advocacy.

In line with the responsibilities outlined in Table 2 above, it is important to emphasize that the prevention dimension of the Polluter Pays Principle places the primary burden on manufacturers as the earliest and most structurally significant polluters in the life cycle of electronic products. Because manufacturers determine product design, material composition, durability, repairability, and availability of return pathways, they effectively shape the volume, toxicity, and recoverability of future e-waste long before it reaches consumers or waste management systems [27]. In the Polluter Pays Principle, these upstream choices constitute preventable sources of pollution, meaning manufacturers must internalize environmental risks through eco-design, reduction of hazardous substances, extension of product lifespan, and establishment of accessible collection and return schemes. Retailers and consumers play important supporting roles, but neither has the same level of influence over upstream waste generation. Thus, the responsibility for prevention in the Polluter Pays Principle essentially begins with manufacturers, whose initial decisions directly determine whether downstream pollution occurs.

Global best practices demonstrate how producer-centered prevention responsibility can be operationalized. Apple's international trade-in and return system allows consumers to return used devices, which are then processed using advanced robotic disassembly technologies like Daisy and Dave [28]. By integrating recycling into product design, building closed-loop material recovery, and funding its own collection mechanisms, Apple exemplifies how manufacturers can meet upstream obligations under the Polluter Pays Principle by preventing pollution long before waste becomes hazardous. This model reinforces the idea that the Polluter Pays Principle should operate not just as a post-pollution accountability framework, but also as a proactive, lifecycle-based governance approach that places primary responsibility on manufacturers to ensure environmentally safe product flows from the outset.

While global examples like Apple's circularity model highlight how upstream producer responsibility can be institutionalized, the practical realities of electronic waste governance in Indonesia reveal a different set of challenges. Insights from practitioners in the field further highlight that electronic waste management is inherently issue. According to Rafa Jafar from E-WasteRJ, "electronic waste management is a very local issue," meaning that local governments should ideally have the flexibility to tailor the regulations to the spesific social, infrastructural, and environmental conditions of each region.[17] He also emphasized that coordination between institutions, such as the Ministry of Environment and Forestry, the Ministry of Industry, the Ministry of Communications and Information Technology, the National Development Planning Agency (*Bappenas*), and local governments has not yet been consolidated. Therefore, in addition to a national regulatory framework, a stricter collaborative agreement is needed that explicitly defines the roles and responsibilities of each stakeholder in the sector.

This perspective reinforces the urgency of implementing the Polluter Pays Principle in the regulation of electronic waste: not only holding producers accountable, but also ensuring that all actors from central and local governments, producers and distributors, to formal and informal waste managers have clearly regulated and enforceable obligations.

[17] Information derived from an online interview, conducted on 17 November 2025.

4. Conclusion

This research shows that electronic waste management in Indonesia still lacks a comprehensive legal framework, particularly regarding the definition of electronic waste and the division of responsibilities among stakeholders. Existing regulations, both at the national and regional levels only partially address electronic waste with inconsistent definition, thus failing to provide an integrated management mechanism. An analysis of the Polluter Pays Principle reveals that although this principle has been adopted in several laws and regulations, its implementation has not been explicitly applied to the electronic waste context. However, based on the electronic product life cycle (manufacturer–retailer–consumer–collector–recycler–disposal), each stage has the potential to cause environmental impacts and requires a clear allocation of responsibilities.

By integrating Polluter Pays Principle into electronic waste management, this research confirms that:

1. Manufacturers must assume primary responsibility, including for environmentally friendly design, collection and recycling funding, and environmental restoration.
2. Retailers, consumers, and waste management actors (formal and informal) have behavioral, operational, and legal obligations in the event of pollution.
3. The government is responsible for ensuring law enforcement, infrastructure provision, and Polluter Pays Principle-based regulations.

Therefore, implementing the Polluter Pays Principle in e-waste regulations will increase accountability, encourage economic circulation, and align Indonesian policies with international sustainable practices.

5. Acknowledgement

The authors would like to express their sincere gratitude to Universitas Prasetiya Mulya for providing financial support for the paper submission and conference attendance, including transportation and registration costs. The authors also extend their appreciation to E-WasteRJ for their valuable contribution and willingness to participate in the interview for this research.

6. References

[1] World Health Organization, "Electronic waste (e-waste)," World Health Organization. [Online]. Available: https://www.who.int/news-room/fact-sheets/detail/electronic-waste-(e-waste)

[2] The Nation, "Thailand ranks 3rd in ASEAN for highest e-waste generation," Nation Thailand. [Online]. Available: https://www.nationthailand.com/blogs/sustaination/40055801

[3] International Telecommunication Union, "ITU-D Environment: Indonesia," International Telecommunication Union. [Online]. Available: https://www.itu.int/en/ITU-D/Environment/Pages/Priority-Areas/E-waste/Country Pages/Indonesia.aspx

[4] Jenderal Pengelolaan Sampah Limbah Dan B3 and Kementerian Lingkungan Hidup

Dan Kehutanan Direktorat, "WEBINAR PENGELOLAAN SAMPAH ELEKTRONIK DALAM RANGKA NATIONAL E-WASTE DAY," 2021. [Online]. Available: https://sipsn.menlhk.go.id/download/ewaste2021/(LB3)Pressrelase_Ewaste14Okto2021_KLHK.pdf

[5] M. Defitri, "Electronic Waste Management and Its Regulations in Indonesia," waste4change. [Online]. Available: https://waste4change.com/blog/pengelolaan-sampah-elektronik-dan-peraturannya-di-indonesia/

[6] Ankit *et al.*, "Environmental Technology & Innovation Electronic waste and their leachates impact on human health and environment: Global ecological threat and management," *Environ. Technol. Innov.*, vol. 24, p. 102049, 2021, doi: 10.1016/j.eti.2021.102049.

[7] S. T. Ghulam and H. Abushammala, "Challenges and Opportunities in the Management of Electronic Waste and Its Impact on Human Health and Environment," *Sustainability*, vol. 15, no. 3, 2023, doi: https://doi.org/10.3390/su15031837.

[8] B. Rahmanda, R. Njatrijani, and R. Fadillah, "Policy in Managing E-Waste Recycling: Promoting a Clean Environment in Public Policy," *Int. J. Sustain. Dev. Plan. Environ.*, vol. 18, no. 1, pp. 121–126, 2023, doi: https://doi.org/10.18280/ijsdp.180112.

[9] A. K. Attazahri, U. S. Putro, and A. Nita, "Designing Scenarios for Integrated and Sustainable E-Waste Management : Case of Indonesia," *Indones. J. Sustain. Account. Manag.*, vol. 5, no. 2, pp. 209–221, 2921, doi: 10.28992/ijsam.v5i2.387.

[10] S. Amalia, I. A. Tarigan, A. Rizkiyani, and C. Apriono, "Analysis of Effectiveness in the Utilization and Control of Electronic Waste (E-Waste) in Indonesia," *Green Intell. Syst. Appl.*, vol. 1, no. 1, pp. 1–11, 2021, doi: https://doi.org/10.53623/gisa.v1i1.29.

[11] R. Zulkarnaen, M. Hilqiya, R. I. Andini, S. Sari, and Y. W. Harimurti, "Kajian Urgensi Undang Undang Pengelolaan Limbah Elektronik Upaya Mewujudkan Net Zero Emision," *Aliansi J. Hukum, Pendidik. dan Sos. Hum.*, vol. 2, no. 6, pp. 72–84, 2025, doi: https://doi.org/10.62383/aliansi.v2i6.1324.

[12] S. Raharjo and A. H. Utomo, "Comparative Study of Electronic Waste Management in Developed Countries and Indonesia," *Andalasian Int. J.*, vol. 01, no. 01, pp. 21–32, 2021, [Online]. Available: https://aijaset.lppm.unand.ac.id/index.php/aijaset/article/view/4/13

[13] E-WasteRJ, "ewasterj: Home." [Online]. Available: https://ewasterj.com/

[14] F. U. Puluhulawa and A. A. Harun, "Enabling Circular Economy : Towards Sustainable Electronic Waste Management Regulation," *Jambura Law Rev.*, vol. 6, no. 01, pp. 33–65, 2024, doi: https://ejurnal.ung.ac.id/index.php/jalrev/index.

[15] Dharmawanita, "Socialization of Waste Reduction and Sorting in DKI Jakarta Province," Dharmawanita Persatuan. [Online]. Available: https://dharmawanitapersatuan.id/sosialisasi-pengurangan-dan-pemilahan-sampah-di-lingkungan-provinsi-dki-jakarta/

[16] European Commission, "COMMISSION STAFF WORKING DOCUMENT EVALUATION of the Directive 2012/19/EU on waste electrical and electronic equipment (WEEE)," 2025. [Online]. Available:

https://environment.ec.europa.eu/document/download/80a8ecfd-6dff-4cf6-80e5-762e3446fa80_en?filename=SWD_2025_184_1_EN_dts_evaluation_part1_v2.pdf

[17] Official Journal of the European Union, *COMMISSION RECOMMENDATION (EU) 2023/2585 of 6 October 2023 on improving the rate of return of used and waste mobile phones, tablets and laptops*. 2023. [Online]. Available: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L_202302585

[18] H. P. Johannes, M. Kojima, F. Iwasaki, and E. P. Edita, "Applying the extended producer responsibility towards plastic waste in Asian developing countries for reducing marine plastic debris," *Waste Manag. Res.*, vol. 39, no. 5, pp. 690–702, 2021, doi: 10.1177/0734242X211013412.

[19] A. P. N. Sulami, T. Murayama, and S. Nishikizawa, "Current Issues and Situation of Producer Responsibility in Waste Management in Indonesia," *Environ. Nat. Resour. Journa*, vol. 16, no. 1, pp. 70–81, 2018, doi: 10.14456/ennrj.2018.7.

[20] OECD, "Recommendation of the Council on Guiding Principles concerning International Economic Aspects of Environmental Policies," 2012. [Online]. Available: https://legalinstruments.oecd.org/public/doc/4/4.en.pdf

[21] P. Sands, J. Peel, A. Fabra, and R. MacKenzi, *Principles of International Environmental Law (Third Edition)*. New York: Cambridge University Press, 2012. [Online]. Available: https://books.google.co.id/books/about/Principles_of_International_Environmenta.html?id=R4JIDwAAQBAJ&source=kp_book_description&redir_esc=y

[22] B. Luppi, F. Parisi, and S. Rajagopalan, "The rise and fall of the polluter-pays principle in developing countries," *Int. Rev. Law Econ.*, vol. 32, no. 1, pp. 135–144, 2012, doi: https://doi.org/10.1016/j.irle.2011.10.002.

[23] A. G. Wibisana, "Chapter 3: Three principles of environmental law: the polluter-pays principle, the principle of prevention, and the precautionary principle," in *Environmental Law in Development*, M. Faure and N. Niessen, Eds., Cheltenham: UK: Edward Elgar Publishing, 2006. doi: https://doi.org/10.4337/9781847202918.

[24] N. H. T. Siahaan, *Hukum lingkungan dan ekologi pembangunan (Environmental law and development ecology)*. Jakarta: Erlangga, 2003. [Online]. Available: https://books.google.co.id/books?id=ae7qLHtmcW4C&printsec=frontcover&hl=id#v=onepage&q&f=false

[25] Bale Bandung District Court, *Decision No. 249/Pdt.G/LH/2020/PN Blb*, no. November. 2021, pp. 1–133. [Online]. Available: https://putusan3.mahkamahagung.go.id/direktori/putusan/zaec6e42d1f2fc90a3b7323331363231.html

[26] AllSource Environmental, "Responsible Solutions for Industrial Electronic Recycling," AllSource Environmental. [Online]. Available: https://allsource-environmental.com/responsible-solutions-for-commerical-electronic-e-waste-recycling/

[27] S. Dey, G. T. N. Veerendra, S. S. A. B. Padavala, and A. V. P. Manoj, "Recycling of e-waste materials for controlling the environmental and human heath degradation in India," *Green Anal. Chem.*, vol. 7, no. October, 2023, doi: 10.1016/j.greeac.2023.100085.

[28] Apple Inc., "Environmental Progress Report," 2023. [Online]. Available:

https://www.apple.com/environment/pdf/Apple_Environmental_Progress_Report_2023.pdf

Annex 1: List of Regulations on Polluter Pays Principle in Indonesia

No.	Regulation	Year
Climate Change Sector		
1.	East Kalimantan Province Regional Regulation No. 7 of 2019 on Climate Change Adaptation and Mitigation	2019
Environmental Impact Control Sector		
1.	Serang City Regional Regulation No. 3 of 2012 on Environmental Impact Control	2012
Environmental Pollution and Damage Sector		
1.	West Pesisir Regency Regional Regulation No. 2 of 2016 on the Control of Environmental Pollution and Damage	2016
Environmental Protection and Management Sector		
	Governor Regulation	
1.	Governor Regulation of Yogyakarta Special Region No. 3 of 2015 on Environmental Protection and Management	2015
	Provincial Regulation	
1.	West Java Province Regional Regulation No. 1 of 2012 on Environmental Management and Arrangement of Environmental Law	2012
2.	Maluku Province Regional Regulation No. 15 of 2014 on Environmental Protection and Management	2014
3.	West Sulawesi Province Regional Regulation No. 4 of 2014 on Environmental Protection and Management	2014
4.	South Sulawesi Province Regional Regulation No. 3 of 2014 on Environmental Protection and Management	2014
5.	West Sumatera Province Regional Regulation No. 2 of 2020 on the Planning of Environmental Protection and Management	2020
6.	Central Java Province Regional Regulation No. 4 of 2023 on Environmental Protection and Management	2023
7.	North Sumatera Province Regional Regulation No. 11 of 2023 on the Planning of Environmental Protection and Management	2023

	Qanun[18]	
1.	Langsa City Qanun No. 4 of 2015 on the Planning of Environmental Protection Management	2015
	Regional Regulation	
1.	Semarang City Regional Regulation No. 13 of 2006 on Environmental Control	2006
2.	Surakarta City Regional Regulation No. 2 of 2006 on Environmental Management	2006
3.	Tangerang City Regional Regulation No. 2 of 2009 on Environmental Management	2009
4.	Batang Regency Regional Regulation No. 16 of 2010 on Environmental Protection and Management.	2010
5.	Pekalongan City Regional Regulation No. 3 of 2010 on Environmental Protection and Management of Pekalongan City	2010
6.	Tangerang Regency Regional Regulation No. 2 of 2010 on Environmental Supervision and Management	2010
7.	Blora Regency Regional Regulation No. 2 of 2011 on Environmental Protection and Management.	2011
8.	Donggala Regency Regional Regulation No. 6 of 2011 on Environmental Protection and Management	2011
9.	Madiun City Regional Regulation No. 19 of 2011 on Environmental Protection and Management	2011
10.	Serang Regency Regional Regulation No. 8 of 2011 on Environmental Protection and Management	2011
11.	Karawang Regency Regional Regulation No. 14 of 2012 on Environmental Protection and Management	2012
12.	Rembang Regency Regional Regulation No. 5 of 2012 on Environmental Protection and Management in Rembang Regency	2012
13.	Sidenreng Rappang Regency Regional Regulation No. 2 of 2012 on Environmental Protection and Management	2012
14.	West Sumatra Regency Regional Regulation No. 14 of 2012 on Environmental Protection and Management	2012
15.	Wonogiri Regency Regional Regulation No. 6 of 2012 on Environmental Protection and Management	2012

[18] Article 1 Paragraph 22 of Law Number 11 of 2006 on Aceh Government defines Qanun for Regency and City Level as "a type of statutory regulation in the form of a regency/city regional regulation that regulates the administration and life of the regency/city community in Aceh."

16.	Yogyakarta City Regional Regulation No. 1 of 2012 on Environmental Management	2012
17.	East Lombok Regency Regional Regulation No. 8 of 2013 on Environmental Protection and Management	2013
18.	Kebumen Regency Regional Regulation No. 8 of 2013 on Environmental Protection and Management	2013
19.	West Lombok Regency Regional Regulation No. 3 of 2013 on Environmental Protection and Management	2013
20.	Sijunjung Regency Regional Regulation No. 11 of 2013 on Environmental Protection and Management	2013
21.	Sumedang Regency Regional Regulation No. 2 of 2013 on Environmental Protection and Management in Sumedang Regency	2013
22.	Tarakan City Regional Regulation No. 2 of 2013 on Environmental Protection and Management	2013
23.	Banyumas Regency Regional Regulation No. 18 of 2014 on Environmental Protection and Management	2014
24.	Batang Hari Regency Regional Regulation No. 5 of 2014 on Environmental Protection and Management	2014
25.	Bogor City Regional Regulation No. 1 of 2014 on Environmental Protection and Management	2014
26.	Ciamis Regency Regional Regulation No. 7 of 2014 on Environmental Protection and Management	2014
27.	Cilacap Regency Regional Regulation No. 2 of 2014 on Environmental Protection and Management	2014
28.	East Luwu Regency Regional Regulation No. 7 of 2014 on Environmental Protection and Management	2014
29.	Tasikmalaya Regency Regional Regulation No. 5 of 2014 on Environmental Protection and Management	2014
30.	Bantul Regency Regional Regulation No. 12 of 2015 on Environmental Protection and Management	2015
31.	Boyolali Regency Regional Regulation No. 13 of 2015 on Environmental Protection and Management	2015
32.	Gresik Regency Regional Regulation No. 6 of 2015 on Environmental Protection and Management	2015
33.	Kudus Regency Regional Regulation No. 6 of 2015 on Environmental Protection and Management in Kudus Regency	2015
34.	Padang City Regional Regulation No. 8 of 2015 on Environmental Protection and Management	2015

35.	Sinjai Regency Regional Regulation No. 6 of 2015 on Environmental Protection and Management	2015
36.	West Tanjung Jabung Regency Regional Regulation No. 2 of 2015 on Environmental Protection and Management	2015
37.	Banjar City Regional Regulation No. 2 of 2016 on Environmental Protection and Management in Banjar City	2016
38.	Bogor Regency Regional Regulation No. 6 of 2016 on Environmental Protection and Management	2016
39.	Pinrang Regency Regional Regulation No. 2 of 2016 on Environmental Protection and Management	2016
40.	Demak Regency Regional Regulation No. 8 of 2016 on Environmental Protection and Management in Demak Regency	2016
41.	Kulon Progo Regency Regional Regulation No. 10 of 2016 on Environmental Protection and Management	2016
42.	Magelang Regency Regional Regulation No. 4 of 2016 on Environmental Protection and Management	2016
43.	Malang Regency Regional Regulation No. 3 of 2016 on Environmental Protection and Management	2016
44.	Pasuruan Regency Regional Regulation No. 8 of 2016 on Environmental Protection and Management	2016
45.	South Solok Regency Regional Regulation No. 3 of 2016 on Environmental Protection and Management	2016
46.	Tegal City Regional Regulation No. 2 of 2016 on Environmental Protection and Management	2016
47.	Tana Toraja Regency Regional Regulation No. 7 of 2016 on Environmental Protection and Management	2016
48.	Central Lampung Regency Regional Regulation No. 4 of 2017 on Environmental Management	2017
49.	Dharmasraya Regency Regional Regulation No. 2 of 2017 on Environmental Protection and Management	2017
50.	Jombang Regency Regional Regulation No. 8 of 2017 on Environmental Protection and Management	2017
51.	Pariaman City Regional Regulation No. 2 of 2017 on Environmental Protection and Management	2017
52.	Merangin Regency Regional Regulation No. 5 of 2018 on Environmental Protection and Management	2018
53.	Semarang Regency Regional Regulation No. 1 of 2018 on Environmental Protection and Management	2018

54.	West Tulang Bawang Regency Regional Regulation No. 11 of 2018 on Environmental Protection and Management	2018
55.	Nganjuk Regency Regional Regulation No. 11 of 2019 on Environmental Protection and Management	2019
56.	Sampang Regency Regional Regulation No. 5 of 2019 on Environmental Protection and Management	2019
57.	Jambi City Regional Regulation No. 4 of 2020 on Environmental Protection and Management	2020
58.	Temanggung Regency Regional Regulation No. 9 of 2020 on Environmental Protection and Management	2020
59.	Blora Regency Regional Regulation No. 15 of 2022 on Environmental Protection and Management	2022
60.	Boyolali Regency Regional Regulation No. 16 of 2022 on the Implementation of Environmental Protection and Management	2022
61.	Grobogan Regency Regional Regulation No. 3 of 2022 on the Planning of Environmental Protection and Management of Grobogan Regency 2022-2052	2022
62.	Sleman Regency Regional Regulation No. 15 of 2022 on the Implementation of Regional Environmental Protection and Management	2022
63.	Wonosobo Regency Regional Regulation No. 4 of 2022 on Environmental Protection and Management	2022
64.	Sukoharjo Regency Regional Regulation No. 5 of 2023 on Environmental Protection and Management	2023
65.	Yogyakarta City Regional Regulation No. 9 of 2023 on the Implementation of Environmental Protection and Management	2023
66.	Ciamis Regency Regional Regulation No. 4 of 2024 on the Implementation of Environmental Protection and Management	2024
67.	Sragen Regency Regional Regulation No. 3 of 2025 on Environmental Protection and Management	2025
Management of Hazardous and Toxic Waste		
1.	Central Lampung Regency Regional Regulation No. 7 of 2014 on Management of Hazardous and Toxic Waste	2014
2.	Tanggamus Regency Regional Regulation No. 7 of 2014 on Management of Hazardous and Toxic Waste	2014
3.	Tulungagung Regency Regional Regulation No. 14 of 2015 on Management and Control of Toxic and Hazardous Waste Substance	2015
4.	Tulang Bawang Regency Regional Regulation No. 5 of 2016 on Management of Hazardous and Toxic Substance	2016

5.	Kendal Regency Regional Regulation No. 4 of 2017 on the Management of Hazardous and Toxic Waste in Kendal Regency	2017
6.	Langkat Regency Regional Regulation No. 8 of 2018 on Management of Hazardous and Toxic Waste Substance	2018
7.	Bontang City Regional Regulation No. 8 of 2020 on Management of Hazardous and Toxic Waste Susbstance	2020
Maintenance of Order and Cleanliness		
1.	Purworejo Regency Regional Regulation No. 8 of 2014 on the Maintenance of Order, Cleanliness, and Beauty	2014
Waste Management		
	Presidential Regulation	
1.	Presidential Regulation No. 109 of 2025 on Urban Waste Handling through Waste Processing into Renewable Energy Based on Environmentally Friendly Technology	2025
	Regional Regulation	
1.	West Kutai Regency Regional Regulation No. 3 of 2019 on Waste Management	2019
2.	Jambi City Regional Regulation No. 5 of 2020 on Waste Management	2020