e-ISSN: 2839-5786, p-ISSN: 3139-8464 | JATIR

Environmental Liability for E-Waste: A Comparative Study of India's Environmental Compensation Framework and the European Union's Polluter-Pays Approach

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***Abstract*—Electronic waste depicts a challenging environmental governance question. Unwanted electrical and electronic equipment contains materials can be recovered. They may also contain hazardous substances that threaten workers, nearby communities and ecosystems when it is handled or processed without safety measures. The legal issue is therefore bigger than collection and recycling. It concerns who must put a stop to harm and who should bear the costs when the waste-management system fails. This article assesses India's E-Waste (Management) Rules, 2022, with particular attention to extended producer responsibility (EPR) and environmental compensation, and parallels them with the European Union's Waste Electrical and Electronic Equipment (WEEE) Directive and Environmental Liability Directive (ELD). It uses doctrinal legal research and a functional comparative method, drawing on legislation, official guidance, judicial decisions and selected literature. The article discusses that India has established a formal, portal-based system for producer obligations, but its effectiveness depends on whether reported recycling resembles to safe and demonstrable processing. Environmental compensation must be assessed clearly and should not replace prevention, clean-up or restoration where those measures are required. The EU framework proposes useful lessons in producer financing, traceability and redressal, although the WEEE Directive and ELD serve different purposes and do not outline a single, universal compensation code. The article acclaims sturdier verification, indistinct public reporting, rational compensation decisions, accessible take-back arrangements and trails for informal workers to participate in safer systems.**

***Index Terms*—e-waste; environmental liability; extended producer responsibility; environmental compensation; polluter-pays principle; WEEE Directive; India; European Union**

e-ISSN: 2839-5786, p-ISSN: 3139-8464 | JATIR

I. INTRODUCTION

Electrical and electronic equipment is now vital to communication, education, healthcare, commerce and everyday life. As products are replaced more often and consumption surges, discarded equipment has become a growing waste-management challenge. E-waste varies from many ordinary waste streams because it can contain valuable recoverable materials. It also comprises dangerous constituents, including lead, mercury, cadmium and certain flame retardants. When equipment is dismantled, burned or processed without sufficient safeguards, the outcomes may be shouldered by workers, nearby residents, soil and water.

The Global E-waste Monitor 2024 projected that 62 billion kilograms of e-waste were generated worldwide in 2022. 22.3 percent was acknowledged as formally collected and recycled in an environmentally sound manner. These are global figures, not a direct measure of India's performance. They demonstrate the distance that can exist between the volume of discarded equipment and the amount managed through documented, environmentally sound systems.[1]

Responsibility is tough to allocate when the waste chain involves several actors. A producer places a product on the market, a consumer later discards it, a collector may pass it to a dismantler, and another operator may recover materials or dispose of residues. If pollution occurs, the person carrying out the final unsafe act may be difficult to identify, while other actors may have influenced the product's end-of-life management or benefited from its sale. Regulation must therefore allocate duties before harm occurs and provide credible consequences when those duties are breached.

The E-Waste (Management) Rules, 2022 in India that became operative from 1 April 2023 have extended producer responsibility at the heart of their regulatory regime. On the other hand, in the European Union, waste electrical and electronic equipment is regulated by Directive 2012/19/EU referred to as WEEE Directive. EU also has an Environmental Liability Directive 2004/35/EC, which provides a legal framework for prevention and reparation of certain types of environmental damage. The above-mentioned legal tools have certain things in common, but their legal purposes differ.

This article addresses three questions: how India's current e-waste framework allocates responsibility and provides for environmental compensation; what lessons can be drawn from the EU's producer-financing and environmental-liability arrangements; and what changes could make India's system more transparent, restorative and effective. Its central argument is that the key challenge is not simply the existence of formal EPR obligations. It is whether compliance records reflect actual, safe processing and whether compensation is imposed and used in a way that supports environmental protection.

[1] Cornelis P. Baldé, Ruediger Kuehr, Tales Yamamoto, Rosie McDonald, Elena D'Angelo, et al., "The Global E-waste Monitor 2024" (International Telecommunication Union and United Nations Institute for Training and Research, 2024), https://www.itu.int/pub/D-GEN-E_WASTE.01-2024 (accessed 18 October 2026).

e-ISSN: 2839-5786, p-ISSN: 3139-8464 | JATIR

II. RESEARCH METHODOLOGY AND SCOPE

The article uses doctrinal legal research and a focused comparative method. Its principal sources are the E-Waste (Management) Rules, 2022, together with amendments by the Central Pollution Control Board (CPCB); the CPCB's environmental compensation guidelines approved by the Ministry of Environment, Forest and Climate Change in September 2024; Directive 2012/19/EU; Directive 2004/35/EC; and the Supreme Court's decision in Vellore Citizens' Welfare Forum v. Union of India. Secondary literature and the Global E-waste Monitor are used to provide context. Comparison is made regarding their functionality; there is no attempt to compare the legal frameworks of India and the EU as they are absolutely the same. Obligations of the regulated entities are considered as well as roles of the CPCB and the State Pollution Control Boards and the scheme of environmental compensation. As to the EU framework, two different instruments are examined: WEEE Directive, regulating collection, treatment, recovery, and financing and ELD regulating prevention and remediation of the prescribed environmental damage. Producers' financing through the means of the WEEE Directive cannot be regarded as liability under the ELD.

No field survey was made in this research; no calculations were made regarding the amount of the illegally processed e-waste in India at the present time. Previous Indian laws cannot be regarded as evidence of results of the 2022 Rules. So, this paper makes a legal and institutional evaluation of the framework and not an empirical one, providing no evidence of its effectiveness or inefficacy in each particular State.

III. E-WASTE AND THE POLLUTER-PAYS PRINCIPLE

The polluter pays principle implies that people responsible for the pollution should bear the burden of preventing, controlling, and remedying it and not leaving these costs to the public. It does not only serve as a tool to impose a penalty on the violators but also influences regulation design making it necessary to account for the environmental costs when making business decisions.

In Vellore Citizens' Welfare Forum v. Union of India[2], the Supreme Court recognized both the precautionary principle and the polluter pays principle as an integral part of the Indian environmental law. According to the Supreme Court, the polluter pays principle is more than compensation to the persons affected by the pollution but the restoration of the degradation of the environment.

There are at least three recurrent issues associated with e-waste. Firstly, there might be more than one actor who may be responsible for safe disposal. An entity responsible for improper disposal of an electronic device does not necessarily have to be the only actor who could prevent this problem. Secondly, it could be hard to prove that a certain item had contaminated a place. It might happen after some time, and linking it to any particular operation or shipment will take a

[2] Vellore Citizens' Welfare Forum v. Union of India, (1996) 5 SCC 647.

e-ISSN: 2839-5786, p-ISSN: 3139-8464 | JATIR

lot of effort. Thirdly, imposing some penalty could not work since it might be smaller than the sum saved through illegal behavior.

The Extended Product Responsibility (EPR) concept resolves the issue in part by shifting the responsibilities for products at their end-of-life stage onto producers. They can influence design and sales strategy, and it may help to develop a system of collection and recycling. EPR, however, does not impose liability on all producers for injuries from a product.

EPR and environmental compensation must be differentiated. EPR establishes obligations for the future that involve registration and the fulfillment of recycling obligations. Environmental compensation establishes the monetary consequence in relation to certain failures within the legal context. Civil suits, criminal cases, and directions to remediate the failure, based on the circumstances and legal context, could also apply. This process works most effectively when both work together.

IV. INDIA'S LEGAL FRAMEWORK

4.1 Statutory foundation and regulatory scope

The E-Waste (Management) Rules, 2022 were made under the Environment (Protection) Act, 1986 and replaced the 2016 Rules, subject to the applicable treatment of earlier acts and omissions. They came into force on 1 April 2023. The Rules are applicable to specified manufacturers, producers, refurbishers, dismantlers, and recyclers for dealing with equipment specified in Schedule I, excluding the specified items. Batteries waste management is done under the Battery Waste Management Rules, 2022.[3]

It is important as it imposes specific regulatory obligations on the relevant entities and not just voluntary collection or recycling. The registration and compliance process is facilitated through a specific digital platform. E-waste portal of the CPCB is where one can find the Rules, amendment to the Rules, and guidelines on environmental compensation. Researchers and regulated entities should nevertheless consult the relevant notifications and operative legal text, rather than relying only on the date or description shown on a portal.[4]

4.2 Extended producer responsibility

EPR is the central feature of the 2022 Rules. Producers are obligated to comply with the recycling targets stipulated under the Rules and their schedules. The compliance system involves registration and issuance and use of EPR certificates by registered recyclers and producers. The expected outcome is the establishment of the link between a producer's recycling target and the recycling done by registered facilities.

[3] The E-Waste (Management) Rules, 2022 (G.S.R. 801(E), 2 November 2022), rr. 1–2, https://moef.gov.in/uploads/2022/11/E-Waste-Management-Rules-2022.pdf (accessed 18 October 2026).

[4] Central Pollution Control Board, "E-Waste Management System", https://eprewaste.cpcb.gov.in/ (accessed 18 October 2026).

e-ISSN: 2839-5786, p-ISSN: 3139-8464 | JATIR

But it is not the certificate alone that ensures that the waste has been managed safely at all stages. The compliance system needs accurate data, actual recycling capacity, checks against double counting or exaggeration, and inspection that can verify the activities reported. The danger when certification becomes the measure of compliance is that the administrative accomplishment is taken for the environmental accomplishment. The significance of this lies in liability, where the information used to measure compliance becomes discredited.

4.3 Environmental compensation under the 2022 Rules

Rule 22 provides for environmental compensation in connection with contraventions of the Rules. The CPCB came up with guidelines on environmental compensation in terms of the Rules, which went through a stakeholder consultation process and received approval from the Ministry of Environment, Forest and Climate Change through an Office Memorandum dated 9 September 2024. [5] The publication of an assessment methodology makes the exercise of regulatory authority predictable insofar as such a methodology is consistently employed within the existing legal framework.

Environmental compensation can prevent non-compliance by removing any economic benefit from failing to observe statutory obligations and indicating that there will be an economic cost attached to fulfilling environmental obligations. It can become relevant, for example, where an entity fails to meet EPR obligations or does not observe the requirements set out in law. The justification and amount of the compensation need to be determined based on the Rules and the applicable guidelines on environmental compensation. It cannot be assumed that the same formula will apply to all types of contraventions and that payment will automatically remove other legal obligations.

Environmental regulatory compensation is different from private damages too. In the former, the basis is regulatory whereas in the latter there could be a claim against an injury or harm done to an individual. In no case should either be treated as evidence that the land, water or the ecosystem in question is being returned to their natural states. In cases where other preventative or remedial action needs to be taken, it has to be considered by the authority separately.

To gain confidence of the public, the statement made by the assessment must have the legal standing and the factors associated with it should be highlighted. Similar cases should be handled in the same manner, affected parties should be given a chance to comment, and the outcomes should be accessible except for those issues which need to be kept confidential. In case harmful activities are still going on, it should not be treated as approval of such activities.

[5] Central Pollution Control Board, "Environmental Compensation (EC) Guidelines under E-Waste (Management) Rules, 2022 and Amendment Thereof" (approved by Ministry of Environment, Forest and Climate Change Office Memorandum dated 9 September 2024), https://eprewaste.cpcb.gov.in/assets/PDF/EC-Guidelines-under-E-Waste-Management-Rules-2022-25.08.25.pdf.pdf (accessed 18 October 2026).

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4.4 Institutional enforcement and practical limitations

CPCB plays an essential role in the national EPR program; however, State Pollution Control Boards and Pollution Control Committees have vital roles in the overall environmental regulatory regime. For instance, the Maharashtra Pollution Control Board has an e-waste webpage containing regulations, processes, authorized facilities, and annual reports.[6] State-level information is important because the effectiveness of the program hinges on the implementation by institutions and facilities in specific geographical areas.

Kalyan Bhaskar and Rama Mohana Turaga undertook a study regarding the implementation of the earlier rules on e-waste in India – specifically in Ahmedabad. They estimated that at the time they conducted the study only 5 to 15 per cent of e-waste produced would likely go through formal facilities for recycling. One of the reasons they provided was the difficulty of collecting e-waste using formal methods.[7] This information could help in designing an effective collection system, but the study is outdated and cannot give the current formal recycling percentage. Its most important lesson now is that legal obligations alone are not enough to make sure that consumers recycle their e-waste formally.

V. THE EUROPEAN UNION FRAMEWORK

5.1 The WEEE Directive

Directive 2012/19/EU establishes the EU framework for waste electrical and electronic equipment. This deals with prevention, re-use, recycling and other forms of recovery with an objective of minimizing the amount of waste disposed of and enhancing resource efficiency. This legislation also imposes producer responsibility and funding obligations in connection with the management of WEEE.[8]

The Directive makes it mandatory on Member States to provide for the funding by producers of collection, treatment, recovery and environmentally sound disposal of waste from products put on the market after a certain date. Waste generated historically is distinguished from waste generated from newer products. Different funding requirements are provided for household and non-household WEEE. Depending on how the legislation is implemented in individual countries, producers can comply with their obligation either individually or collectively. Producer obligation also applies to producers marketing through distance communication.

There are two specific features that will be of relevance in the Indian context. Firstly, the obligation to fund the management of waste at the end-of-life stage is made a part of the

[6] Maharashtra Pollution Control Board, "Electronic Waste", https://mpcb.gov.in/en/waste-management/electronic-waste (accessed 18 October 2026).

[7] Kalyan Bhaskar and Rama Mohana Rao Turaga, "India's E-Waste Rules and Their Impact on E-Waste Management Practices: A Case Study" 22 Journal of Industrial Ecology 930–942 (2018), https://doi.org/10.1111/jiec.12619 (accessed 18 October 2026).

[8] Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on Waste Electrical and Electronic Equipment (WEEE), arts. 12–13, 16, https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A32012L0019 (accessed 18 October 2026).

e-ISSN: 2839-5786, p-ISSN: 3139-8464 | JATIR

producer responsibility framework without relying completely on the occurrence of pollution. Secondly, collection and treatment are part of a larger framework of targets and reporting.

5.2 The Environmental Liability Directive

Directive 2004/35/EC, the ELD, is a separate instrument. It defines an environmental liability scheme grounded in the polluter-pays principle in relation to the prevention and restoration of specific environmental damage.[9] Such types of damage encompass significant harm to protected species and natural habitats, water damage, and land contamination which pose a significant threat to human health.

The ELD is not a general solution to any personal injuries and property damage. It relies upon the scope of the Directive, the kind of damage, the relevant occupation, and the principles of fault or negligence in regard to this occupation. In case of occupations enumerated in Annex III, the Directive provides for the strict liability regarding environmental damage. However, in some other cases, liability for damage to protected species and natural habitats requires fault or negligence of the person causing the damage.

Where the ELD applies, the operators may have the duty to take preventive action in order to avert any imminent environmental damage, as well as carry out or finance any necessary measures in case there is damage. The important aspect of the decision on the measures to be taken and their cost recovery according to the Directive and its implementation in national law lies within the competence of the competent authority. The idea is that the restoration costs should not be placed on the public if there is a responsible operator.

There may be cases where some of the activities related to the problem of electronic waste will fall under the ELD in case they correspond to the requirements of the Directive. However, it would be wrong to state that all the pollution caused by the activities connected with electronic waste falls under this category automatically. There should be an examination of the activity and the damages against the criteria of the Directive.

5.3 Lessons and limits of the EU model

EU legislation shows that there is benefit in combining producer finance responsibilities with another method of ensuring that specific environmental harm is avoided and corrected. Registration and reporting are also part of that scheme. But such a scheme cannot simply be transplanted without regard to local context, because the collection and processing can happen in very different ways depending on whether informal collectors do most of the collection and regional capacity for enforcement differs.

Nor can EU law be held out as comprehensive and without restrictions. The WEEE Directive leaves key questions to national implementation and application, while the ELD applies in limited circumstances. The helpful question here is not whether India should adopt EU law

[9] Directive 2004/35/EC of the European Parliament and of the Council of 21 April 2004 on Environmental Liability with Regard to the Prevention and Remedying of Environmental Damage, arts. 1–3, 5–8, Annex III, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32004L0035 (accessed 18 October 2026).

e-ISSN: 2839-5786, p-ISSN: 3139-8464 | JATIR

wholesale. It is which elements of it could be made to work better within existing Indian systems.

VI. COMPARATIVE ANALYSIS

6.1 Responsibility before harm and liability after damage

Both India's Rules in 2022 and the EU's WEEE Directive employ EPR to allocate end-of-life obligations to producers. India's electronic platform facilitates the measurement of such obligations via registration and certificates, while the EU approach connects the financial obligations of the producer to arrangements for the collection, treatment, and recovery of goods. In both approaches, the key issue is whether the data on compliance reflects the environmentally sound handling of waste.

The ELD creates a unique framework of preventive and corrective measures against certain environmental harm. In that regard, India's mechanism of compensation for environmental damages pursuant to Rule 22 is closer to contraventions of the e-waste regulations. Nevertheless, the two approaches are dissimilar in many ways, including scope, legal authority and corrective purposes. In any case, the ELD makes one clear point regarding enforcement in India: imposing financial penalties does not mean ignoring the necessity to prevent pollution and remediate the environment.

6.2 Measurement and transparency

Both systems require accurate information. Registration and reporting enhance monitoring, but they alone do not resolve the problem of fake statements, duplicate statements, or compliance merely on paper. In the Indian case, EPR certificates may be backed up by risk-based auditing, physical verification of recycling facilities, and a mass balance analysis of materials collected, treated, and recycled. Such an approach will enable regulators to validate the recycling claimed against the recycling performed.

Public disclosure should go beyond aggregate goals. Subject to any justified need for confidentiality, information about producers and recyclers registered, their recycling obligations, certificates issued and utilized, inspections, compensation orders, appeals, and corrective actions will enable assessment of implementation. Disclosure is especially critical when a regulator enjoys discretion in determining environmental compensation.

6.3 Compensation and restoration

A penalty in environmental terms will discourage non-compliance if it carries a tangible, foreseeable and consistent economic effect. If it does not exceed the cost of compliance, it will simply be perceived as a more economical solution for the entity involved in the environmental violation. If it is ambiguous and not applied in a consistent manner, similarly situated entities can receive disparate treatment.

e-ISSN: 2839-5786, p-ISSN: 3139-8464 | JATIR

The ELD highlights the difference between financial penalty and the duty of prevention/rectification of damage. In India, a distinction needs to be made between the payment of compensation and other directives that may become necessary in order to stop certain activities, control hazardous waste, clean up a contaminated site or restore environmental quality.

6.4 Informal sector and environmental justice

The comparison of the legal options in question will have to be done by taking into consideration the reality of the ways e-waste is collected and recycled. While informal actors may offer an efficient service and provide people with means of earning money, there is always a risk of dangerous dismantling of the waste, open burning and exposing people to toxins, which may prove to be costly. At the same time, the exclusion of informal actors from the system of collection may simply drive the problem somewhere else.

It seems more realistic to consider the possibility of implementing the transition to a safer system, where informal collectors, to the degree that is legally permissible, could register their businesses, undergo training, get safety equipment and tools and establish connections with authorized recyclers. Producer-funded programs should make it easy for people to send back their electronics and profitable for collectors to operate legally. Hence, the environmental liability in such a case would imply more than the responsibility of payment after the harm had been done.

VII. RECOMMENDATIONS FOR INDIA

Firstly, the CPCB is to publish a unified compliance dashboard for the e-waste framework. Producer obligations, reported recycling, certificates issued and used, as well as inspections and non-compliance findings, compensation imposed and recovered amounts should be differentiated and included. Historical data should be shown in a manner that allows for time comparisons while ensuring that truly confidential business information is protected.

Secondly, verification of compliance should be focused on environmental results obtained along with documentary compliance. Risk-based inspections, independent audits and mass-balance checks may test if registered recyclers have processed the quantity indicated. In particular, inspections may be stricter, when recycling claims are unusually high or the facility appears to be limited in its capacity.

Thirdly, environmental compensation assessments ought to be based on sound reasoning and be transparent. Based on the relevant guidelines, decisions must be made and made known. The subject should stay within the limits of confidentiality established by law. Responsible institutions must also allow affected entities to respond to them and the possibility to correct mistakes made. The quality of reasoning may improve compliance and decrease the probabilities of arbitrary treatment.

Fourthly, compensation should be harmonized with prevention and mitigation measures like something other than the payment itself being unable to restore contaminated land, protect

e-ISSN: 2839-5786, p-ISSN: 3139-8464 | JATIR

workers in the affected area or prevent ongoing pollution. Once environmental damage at a site or to a community has been revealed, the governmental body must also establish other measures of containment, clean-up, monitoring and restoration.

The fifth factor is that collection must be convenient for consumers. The presence of authorized collection points, retailer return systems, repair and refurbishment pathways, and relevant return information can decrease the appeal of harmful disposal. The compliance with producer responsibility should be easier if it is simple for customers to return their outdated electronic devices. The pilot projects could be used to assess deposit-refund scheme or other options including their feasibility, clients' conduct, and fraud potential.

The sixth factor is that informal workers must be taken into account in the transition to better waste management approaches. The government and producers might work together to provide training, means of protection, partnerships with the authorized recyclers and assistance to small businesses facilitate compliance with environmental and occupational safety requirements. Inclusion is not about softening the legal standards; it is about making compliance easier and minimizing risks connected with enforcement actions.

To conclude, measures of enforcement must be sufficiently credible and adequate. In situations where the law permits differentiation, repeated or deliberate violations, false documents and pummelled recycling should lead to more serious consequences than minor mistakes of the first time performed and corrected instantly. Proportionality should not imply so much leniency concerning serious pollution; it should mean that the adequate action is commensurate to the nature, duration and consequences of the act of violation, but compliance is expected.

VIII. CONCLUSION

The E-Waste (Management) Rules of 2022 in India have introduced a framework of producer's responsibility that includes registration, recycling obligations, and environmental compensation. The guidelines approved by CPCB form the ground for applying the compensation mechanism in Rule 22. However, the rules, the portal, and the targets do not guarantee effective environmental protection. The implementation of the framework will depend on whether the reported recycling is checked, enforcement is effective, recycling channels are accessible, and the cost of non-compliance is imposed on the responsible parties.

Two lessons come from the EU experience. The first is that producer financing and reporting mechanisms can be included in arrangements for waste collection and treatment. The second is that separate instruments can be used to achieve prevention and remediation of certain environmental damage types. It is important not to consider the two approaches as universal compensatory regimes.

India needs to make the link between EPR compliance and proof of safe, responsible disposal for safe processing, and also make sure that environmental compensation is not used as an excuse for lack of remediation where it is necessary. The efficiency of the system might be improved by way of better publicly available data, sound auditing, logical decisions made, affordable take-

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back options as well as inclusion of informal workers into the system. The implementation of the polluter-pays principle is effective only if it modifies the incentives and allows shifting the costs of hazardous disposal away from workers, communities and society.