Packaging design in low- and middle-income countries

Designing for circularity to improve recycling economics and benefit informal waste workers' livelihoods

The Consumer Goods FORUM

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Contents

About The Consumer Goods Forum

For over 70 years, **The Consumer Goods Forum** the (CGF) has united the world's leading retailers and manufacturers to solve industry-wide challenges.

Guided by the vision 'Better Lives Through Better Business', our work is defined by a singular mission: Bringing together consumer goods manufacturers and retailers in pursuit of business practices for efficiency and positive change across our industry benefiting shoppers, consumers and the world without impeding competition.

The Plastic Waste Coalition of Action

The Plastic Waste Coalition of Action was founded in 2020 by the CGF.

As a CEO-led group of 40+ innovative retailers, manufacturers, and converters, the Coalition aims to promote and support the transition to a circular economy for plastic packaging, with a focus on reducing plastic waste, better plastic, and better systems.

The CGF Plastic Waste Coalition of Action has been exploring Extended Producer Responsibility (EPR) regulation since its inception in 2020 with the publication of Building a Circular Economy for Packaging: A View from the Consumer Goods Industry on Optimal Extended Producer Responsibility.

This was followed by Guiding Principles for Ecomodulation of EPR Fees for Packaging, published in 2020, and Extended Producer Responsibility (EPR) for Packaging: Design and Implementation in Low- and Middle-Income Countries and Critical Considerations for Well-Designed Parallel EPR-DRS Systems for Recycling, both published in 2025.

Foreword

About this publication

The Plastic Waste Coalition of Action developed this document to support circular packaging design and improve informal waste worker livelihoods in Low- and Middle-Income Countries (LMICs).

We extend our sincere gratitude to the knowledge partners, industry experts, and regional contributors whose data, insights, and field perspectives made this document possible.

We hope this paper will serve as a valuable resource for CGF member companies and others in the industry as they engage with government policy makers and other stakeholders in LMICs, and a source of inspiration as they set their own packaging design specifications.

Cédric Dever,
Director, Plastic Waste Coalition
The Consumer Goods Forum

Disclaimer

This paper provides advisory, voluntary, and non-binding recommendations for informational purposes only. Publication of this document does not imply direct endorsement or formal commitment from the CGF or its individual member companies.

The examples, case studies, and references provided within this paper are for informational and context-building purposes only and should not be construed as legal, technical, or professional advice. Packaging regulations, waste management infrastructures, and market conditions vary significantly across regions. Companies and stakeholders should adapt the suggestions in this document to their specific operational contexts, local infrastructure realities, and applicable legal frameworks, seeking independent legal or technical counsel as needed.

Acknowledgements

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Knowledge partners

The following organisations and groups have made a significant contribution to the development of this document, providing valuable feedback, data, and connections to experts within their networks.

The CGF's Human Rights Coalition, a CEO-led coalition of consumer goods companies leading industry actions to respect human rights. Find out more here.

The CGF LATAM is the regional governance body for the CGF in Latin America, uniting leading retailers and manufacturing to drive sustainable industry growth. It facilitates pre-competitive collaboration on critical regional challenges – such as plastic waste, nutrition, and responsible sourcing – to align global strategic priorities with local market realities.

An independent environmental non-profit working on the ground to redesign human systems for the good of people and the planet. Find out more here.

A global network that supports the movement of workers in informal employment. Find out more here.

A non-profit working to solve the plastic pollution challenge and build circular, equitable economies across emerging markets. Find out more here.

A business-led initiative aiming to ensure the human rights of informal waste sector workers are respected and their role in circular value chains recognised. Find out more here.

A democratic, member-based global union federation of waste picker organisations across 38 countries, representing over 500,000 waste pickers, working to secure their recognition, rights, and protections. Find out more here.

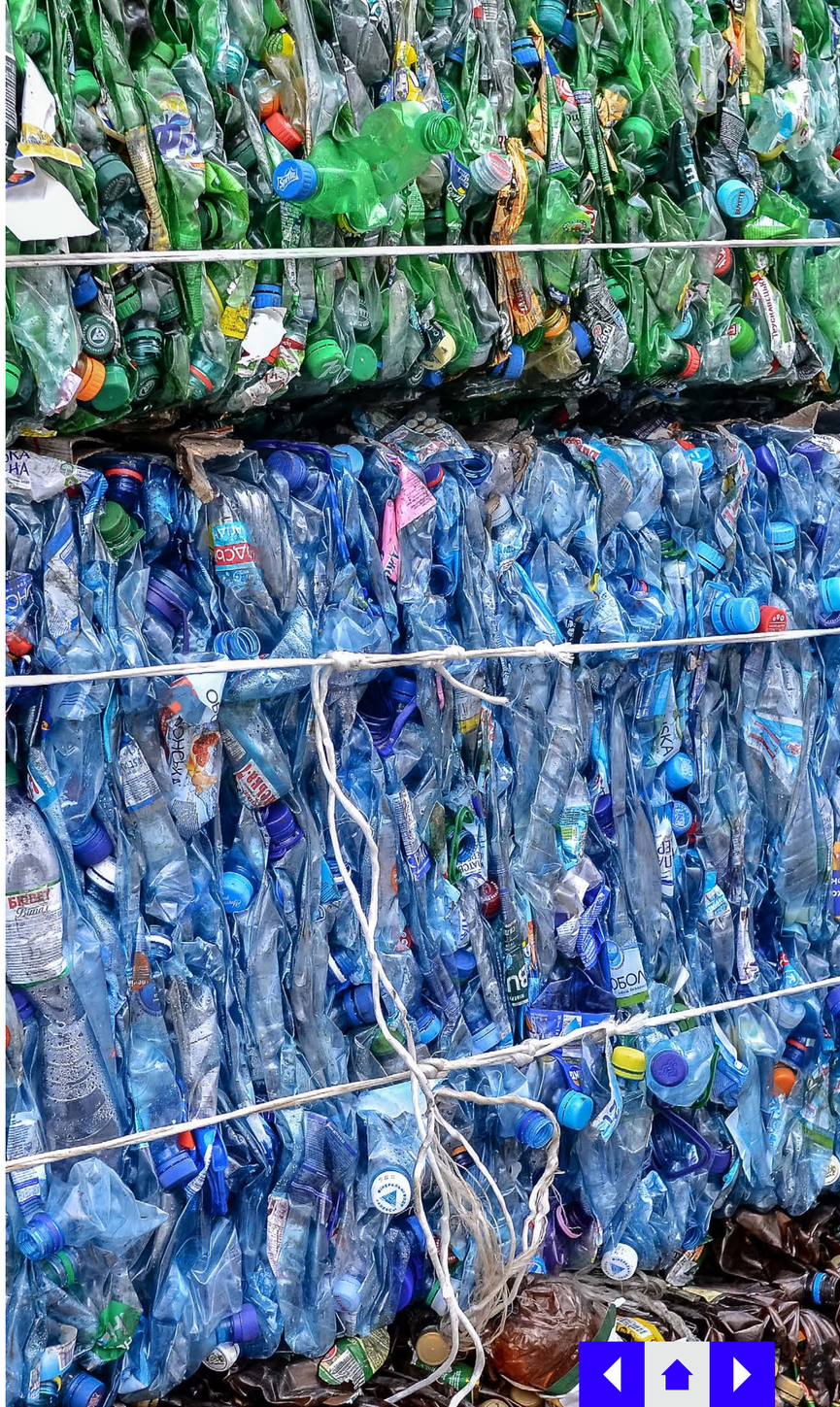
Executive summary

Why packaging design matters in LMICs

- **Implementing simple good-practice packaging design in low- and middle-income countries (LMICs) can simultaneously improve informal waste worker livelihoods, strengthen recycling economics and reduce environmental leakage.** Packaging designed with recycling in mind commands a higher market price (e.g., clear PET bottles sell to recyclers for 3x more than coloured PET bottles in Colombia),[1] increasing the incentive to collect and boosting earnings. It also provides recyclers with more consistent, high-quality feedstock with lower contamination, allowing them to meet buyers' quality requirements.
- **Rigid plastic packaging is the highest-impact starting point for good-practice design.** In LMICs with established collection and recycling value chains, rigid plastics are already collected and recycled. Improving the design of these formats therefore delivers the greatest immediate benefits for informal waste workers, recyclers, and the wider system.
- **Three simple and globally-applicable design guidelines for rigid packaging have been developed by the CGF through a comprehensive industry-led process with backing from global recycling experts and associations:**
  1. **Increase recycling value of PET** by using transparent and uncoloured PET and ensuring material choice, adhesive choice and size of sleeve or label is not problematic for recycling.
  2. **Increase recycling value of rigid HDPE and PP** by ensuring material choice, adhesive choice and size or label is not problematic for recycling; using minimal direct printing; ensuring material choice, liners and seals of closures are not problematic for cycling; and not using fillers that increase packaging density >1g/cm^3.
  3. **Use on pack recycling instructions** on consumer plastic packaging.
- **Where plastic packaging regulations are being developed in LMICs, these simple industry-backed guidelines can be used as a consistent basis for regulations. This will create benefits for people and the economy without adding unnecessary complexity or cost for industry and consumers.** Regulation on plastic packaging is emerging across LMICs in the form of mandatory design for recycling standards and extended producer responsibility (EPR) systems. These systems are likely to include eco-modulated fees, a form of fee-setting that incentivises packaging design suitable for a circular economy by having higher fee contributions for non-recyclable packaging.

$150m+

Total lost potential earnings for waste pickers in LMICs from poorly designed PET bottles.[a]



a Calculated using the discount of coloured PET vs. clear PET for waste pickers and the typical price received for clear PET (Surya Indo Utama, 2026); Indonesia PET volumes (Evtriyandani et al., 2025) and population statistics (World Bank, 2026a) as a proxy for low and middle-income PET consumption; and an estimation of the proportion of coloured PET of total PET using data from South Africa (Petco, 2022).

Aims of this paper

This paper aims to:

1. Describe why the implementation of good-practice packaging design is important in LMICs;
2. Set out simple, good-practice design considerations for rigid plastic packaging in LMICs;
3. Support an evidence-based approach across jurisdictions when shaping rules on packaging design

How this paper can be used

1. In markets that are developing regulation on plastic packaging (e.g., design for recycling standards or EPR systems), this paper can be used by industry associations and other stakeholders to advocate for regulations that are consistent with these globally-applicable guidelines.
2. Individual companies can use the paper as a good-practice design guide when setting their own packaging specifications in these markets.

Note: This design guidance should be adapted to individual market realities and infrastructures through discussion with local organisations including waste pickers' associations, producer groups, industry bodies, regulators, recyclers' associations and clean up groups to ensure they are effective within local contexts.

Image source: bvrio.org

Benefits of implementing good-practice design

Good-practice design matters for three reasons: it raises informal waste worker livelihoods, strengthens recycling economics, and reduces environmental leakage.

Improves informal waste worker livelihoods

Many LMICs rely on the informal waste economy to collect and sort plastic waste. Today, 40 million waste pickers handle approximately 60% of the plastic collected for recycling globally,[2] playing a significant role across the value chain. Despite this substantial economic and social contribution, many remain unrecognised in formal policy frameworks and are vulnerable to a range of negative human rights impacts (due to low incomes, poor working conditions and marginalisation). For example, a survey of waste pickers in India found average earnings of $78 per month (7,100 rupees per month), around 37% of the legal minimum wage.[3] In Ghana, 64% of waste pickers said their household had run out of food at least once in the previous 12 months.[3] Packaging designed with the informal economy in mind could contribute to change this. It lets waste pickers capture more value, earn better wages, and keep high-value materials circulating.

Strengthens recycling economics

Good design makes materials easier and cheaper to process and provides recyclers with higher-quality feedstock. Packaging that is easier to sort by polymer type, colour and format reduces the time that aggregators and material recovery facilities (MRFs) need to bale and sell materials, while poorly designed packaging creates additional sorting, handling and disposal costs (see Case Study). Lower contamination and more consistent material streams make it easier for recyclers to meet buyers' quality requirements. The result is higher market value for recyclable materials and a steady supply of high-quality recycled feedstock for end-markets.

Reduces environmental leakage

Value drives collection. Materials that are worth more to waste pickers and recyclers carry a stronger incentive to collect. This makes them less likely to leak into river, ocean, and terrestrial ecosystems. There is clear evidence of this when looking at the make-up of materials that do leak: of the total plastic that leaks into the environment in Indonesia, 75% is low-value packaging.[4] As a result, design that raises the value of packaging keeps more of it in the system and out of the environment.

Rigid plastic packaging is the highest-impact starting point for good-practice design in LMICs

The benefits outlined are most readily achieved by focusing design guidance on rigid plastic packaging formats where collection, sorting and recycling systems already exist.

PET: typically used for drinks bottles

HDPE and PP rigids: typically used for food and personal / homecare products

In several LMICs, the infrastructure already exists to collect, sort and recycle rigid plastic packaging formats like PET and HDPE / PP.[b] For example, in Thailand, PET, HDPE and PP recycling capacity makes up over 77% of total installed recycling capacity;[5] whilst in Brazil, total installed capacity of PET is over 500,000 metric tons per year.[6]

Because these formats are more likely to be recycled, they carry a higher market value. In West Java, Indonesia, the price of rigid HDPE and PP averaged ~3.5× higher versus multilayer plastics.[7]

Page 12 sets out the specific design rules that industry and policymakers in LMICs could potentially prioritise for these formats, directly taken from the **CGF's Golden Design Rules** – a set of a set of simple, globally-applicable design guidelines for plastic packaging developed alongside packaging experts and industry in 2020.

b There is also value in implementing good design for those packaging formats that are not currently recycled in practice and at scale in LMICs (e.g., flexibles). This should be assessed at the individual country level and with decisions on design made based on existing and future waste management infrastructure.

Rigid packaging designed for recycling generates value at every step of the value chain

Rigid packaging designed for recycling

Circular flow with value created at each stage

$ Collected by informal workers and segregated by households because of a higher price can be demanded

$ Sorted into bales because recognised as valuable by recyclers

$ Recycled without problematic elements, improving recyclate quality

$ New package of high value generated that can re-enter the economy

Rigid packaging designed for recycling generates value at every step of the value chain

Rigid packaging not designed for recycling

Linear flow with costs to people, environment, and the system

Not collected as minimal value for informal workers and households

Not sorted because no demand from recyclers to purchase; high cost to dispose

Rejected from recycling due to problematic elements; high cost to dispose

Leaks into environment and / or open burnt and / or landfilled = value lost

Case study 1

Non-recyclable packaging burdens the informal sector

Cooper Viva Bem, a cooperative in São Paulo, Brazil, receives c.300 metric tons of packaging sorted for recycling per month of which c.45 metric tons (15%) is non-recyclable waste.[8] Handling this material creates a financial and operational burden on the cooperative.

The cost of disposal of non-recyclable waste in sanitary landfills can reach over $2000 / month (R$11000) ($29/R$144 per metric ton on transportation, $20/R$100 per metric ton on landfill fees). This is over 3x the average monthly revenue of each worker in a cooperative in Brazil, at $590 / month (R$2950).[3]

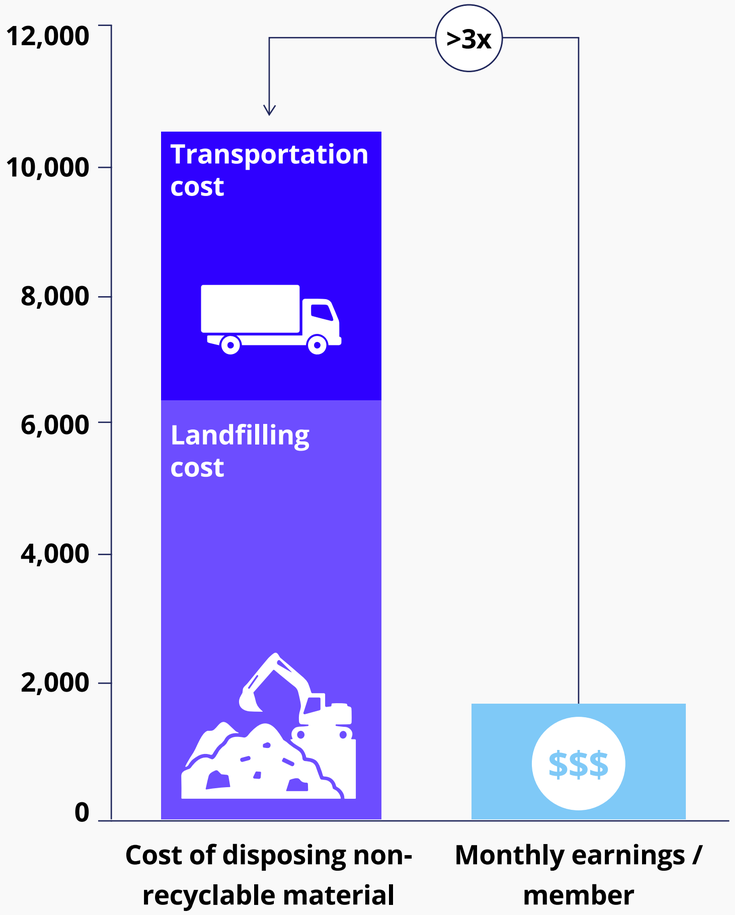
These costs are often borne by cooperatives themselves, eating into profits and reducing earnings for workers in the informal economy.

The time and storage space used to sort non-recyclable packaging is also diverted away from recyclable packaging which can be sold to recyclers, reducing income for the cooperative. Waste pickers in these collectives lose the equivalent of two days per month on sorting poorly-designed materials.[9]

Two days per month

Estimation of time lost by each waste picker from sorting out poorly-designed materials in Brazil.

Cost of disposing non-recyclable materials can reach R$11,000 / month, >3x the average monthly earnings of each cooperative member



c.15% of materials received by Cooper Viva Bem, a cooperative in Sao Paulo, are not recyclable

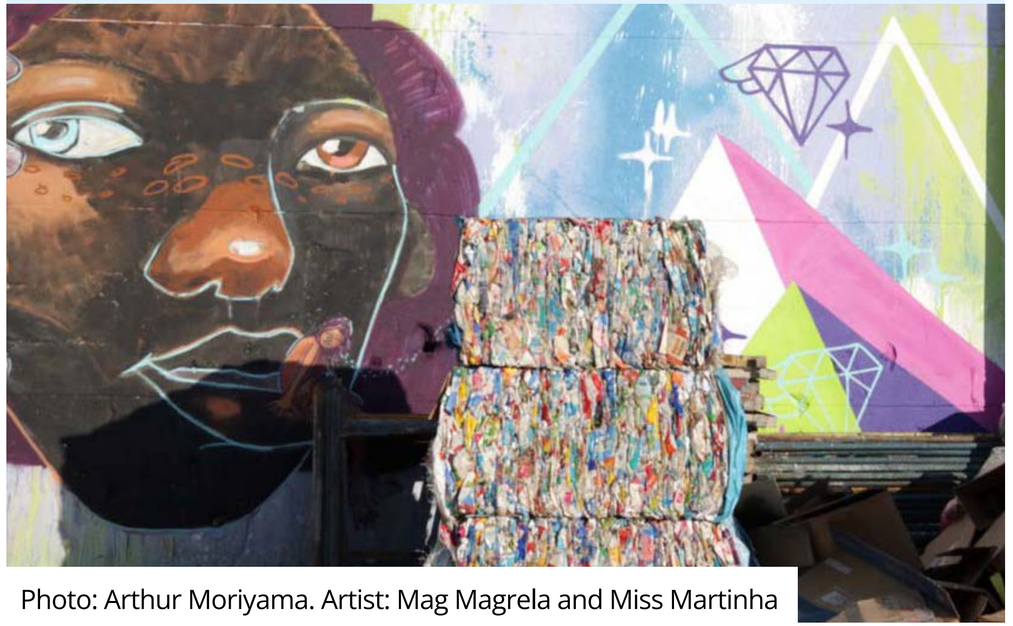


Photo: Arthur Moriyama. Artist: Mag Magrela and Miss Martinha

Three key design practices to implement in LMICs

Key design element #1

Increase recycling value of PET

Recommendations:[c]

- Use transparent and uncoloured PET (preferred), or transparent blue or green in PET bottles[d]
- Ensure material choice, adhesive choice and size of sleeve or label is not problematic for recycling[e]

Key design element #2

Increase recycling value in rigid HDPE and PP

Recommendations:[f]

- For all labels, ensure material choice, adhesive choice, inks and size is not problematic for recycling[g]
- Use minimal or moderate direct printing[h]
- For closures, ensure material choice, liners and seals are not problematic for recycling[i]
- Do not use fillers that increase the density of the packaging to >1g/cm^3

Key design element #3

Use on-pack recycling instructions

Recommendations:

- Include recycling or reuse instructions on consumer plastic packaging[j]

c Where regional guidelines provide more detailed guidance and indicate compatibility with recycling process, please follow those (e.g., APR).
d With a minimum L value of 40.
e Including phase out of PETG, PLA and PVC labels/sleeves, non-water soluble/dispersible adhesives and sleeves that cover more than 75% of bottle (unless proven not to limit the recyclability of the product).
f Where regional guidelines provide more detailed guidance and indicate compatibility with recycling process, please follow those (e.g., APR).
g Including phase out of paper labels, and PET, PETG, PLA and PVC labels/sleeves, unless proven not to be detrimental to recycling process and align with local industry guidance; and non-water soluble/dispersible adhesives, unless proven not to be detrimental to recycling process and align with local industry guidance. Labels/sleeves should not lead to misdetection of the packaging and misdirection to waste. For in-mould labelling use only polyolefins.
h E.g. production or expiry date. Where additional printing is necessary, use of labels or direct printing methods which do not limit recyclability (as per local industry guidance) is preferred. If this is not possible, use only inks that do not bleed or which are proven not to limit recyclability.
i Including phase out of silicone valves, and PVC and silicone seals; PS and PVC; and steel and aluminium caps. Closures should not lead to the misdetection of the packaging and misdirection to waste.
j Instructions should reflect the local realities and be aligned with available waste management capacities locally. Companies should continue to work at the local level to determine the most accurate way to reflect this in each country.

Further detail: Key design element #1 – Increase recycling value of PET

1. Removal of PVC allows for production of food grade r-PET

PVC is often found in labels or closures. Food grade rPET production requires minimal PVC of <15-20 parts per million.[10] This is of higher value to recyclers, selling for c.30% more than non-food-grade rPET in Brazil.[11]

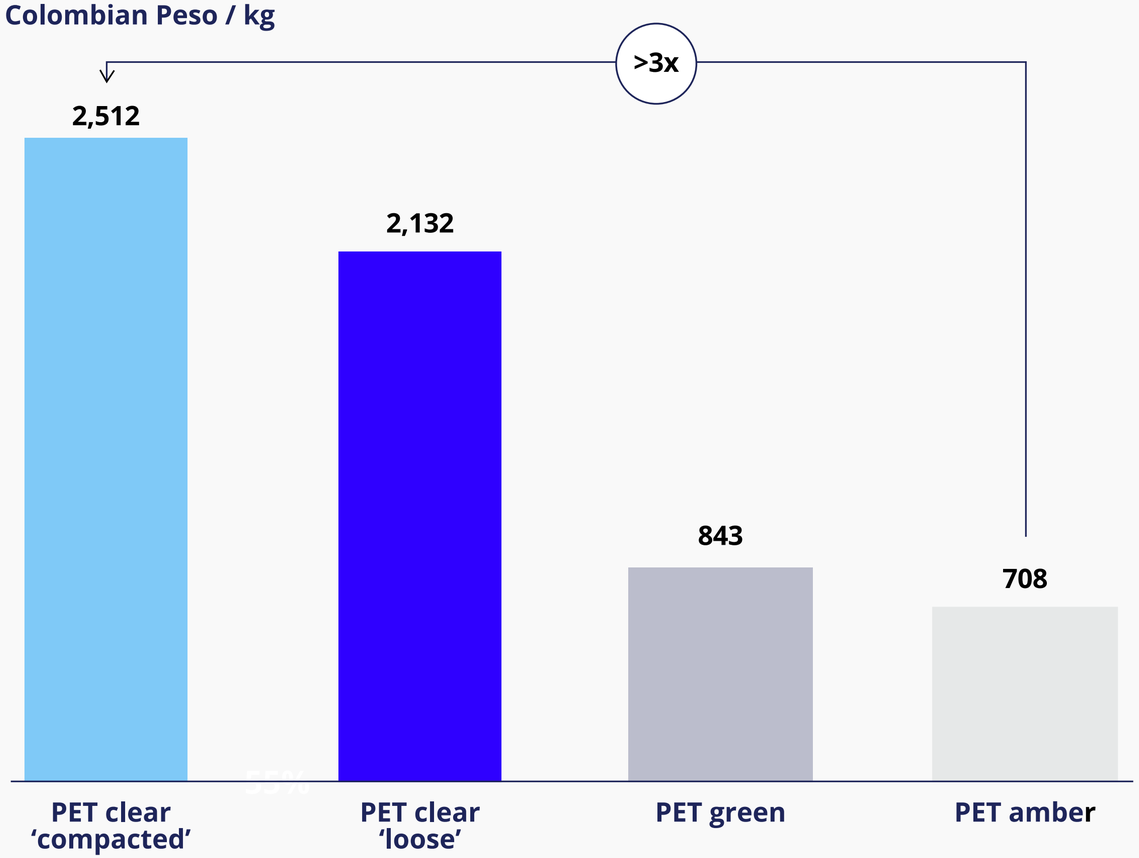
2. Transparent and uncoloured PET secures a higher price than coloured PET

Coloured PET is of lower value to waste pickers and other workers in the informal economy than uncoloured PET. This is true across several LMICs. In Indonesia, collectors receive on average Rp3,000 for coloured PET but Rp5,000 for clear PET, an increase of 66%.[12] And in Colombia, the average sales price of recovered clear PET is roughly 3x the average sales price of recovered green or amber PET.[1]

3. Consider manual sorting when determining whether adhesive choice and size of label in problematic for recycling

Problematic PET bottle labels decrease the price that waste pickers receive for high-value materials. In Goa, India, just the inclusion of labels on PET bottles reduces the price offered by recyclers by 27% (from ₹75 / kg to ₹55 / kg).[13] Ensuring labels are easily removable in the recycling process by minimising label size and amount of adhesive reduces time and resources required to remove labels, making processing cheaper and quicker.

Clear PET bottles sell to recyclers for 3x more than coloured PET bottles in Colombia[a]



Further detail: Key design element #2 – Increase recycling value in rigid HDPE / PP

1. Design labels and closures for recyclability

Workers at ACLAMA, the waste picker's association in Cachoeira de Minas, Brazil, **manually reject approximately 11% of rigid HDPE packaging because of non-recyclable lids, caps and labels**.[14] This includes labels with high amounts of adhesive and labels made from PVC or paper. The rejection not only means lost potential value for waste pickers, but where contaminants are not fully removed and enter the recycling stream, lower recyclate quality. For example, reprocessors in Brazil report that despite the manual sorting, **contamination from PP within labels and closures within the HDPE stream can reach up to 10% by weight, which reduces the price of the resulting r-HDPE pellets**.[14]

2. Blended HDPE and PP closures are rarely recycled

Packaging that mixes several resin types is hard for waste picker organisations to sell. Buyers want a minimum volume of a single material, and mixed plastics cannot meet that. Blended packaging made up around 6% of residual waste at 20 cooperatives surveyed in São Paulo[15] and is a common problem for recyclers in Kenya too.

Many closures are blended HDPE / PP and are not currently recycled. Instead they are dumped, incinerated or landfilled. Switching to closures that are not problematic for recycling, such as mono-material lids, would help avoid environmental pollution and increase the volume of recyclable feedstock available for recyclers.

Non-recyclable blended HDPE / PP closures (on right hand side of image) collected near a recycling centre in Kenya (credit: Mr Green Africa)

Further detail: Key design element #3 – Increase recycling value in rigid HDPE / PP

1. Labelling should clearly indicate material composition

In many LMICs, literacy rates are low and many languages and dialects are spoken. In Brazil, over 10% of **catadores** (collectors of recyclables) have less than one year of education[16] and in Nigeria, over 500 languages are spoken.[17] This makes labels hard to understand. **Where labelling is unclear, waste pickers may be unable to capture the full value of the recyclable material.** In São Paulo, for example, two cooperatives had to dispose of 27% of otherwise recyclable packaging because the resin codes could not be identified, leaving no way to sort or sell it on to recyclers.[18]

In markets with large informal workforces, policymakers and industry need to agree a labelling approach that can be understood regardless of literacy or language. **This can improve identification, sorting and collection of high-value rigid plastics.** The UN Conference on Trade and Development (UNCTAD) identified South Africa's On-Pack Recycling Labelling (OPRL) as good practice for developing countries, citing its simple design, easy-to-follow instructions and the consumer research carried out before rollout.[19]

Conclusions

Governments and industry associations increasingly recognise **that good packaging design and clear labelling are important levers to improve the collection, sorting and recovery of packaging materials where adequate waste management infrastructure exists.** Together, these create value: better productivity and earnings for the informal sector; a larger supply of high-quality recycled feedstock for recyclers and domestic industry; and lower leakage of plastic waste into the environment.

The guidance outlined within this paper is particularly timely as governments across LMICs increasingly look to influence the design of plastic packaging via design for recycling standards or via incentive mechanisms within

EPR systems. Industry associations and other stakeholders can use this document to encourage the adoption of these globally applicable design guidelines backed by industry and recycling experts. Manufacturers that adopt design-for-recycling principles can get ahead of incoming regulation, and benefit from eco-modulation of fees as these systems develop.

Tailoring this guidance to local contexts and shaping the regulation around it requires a multi-stakeholder approach. This means consulting local stakeholders, including waste pickers' associations, recyclers' associations and others. Individual companies are encouraged to use this document to engage industry associations in markets that are adopting packaging design guidance for the first time to reduce the fragmentation of standards across different markets.

Appendix

Glossary of terms

Good practice: Packaging design approaches that are science-based, improve environmental outcomes, and informed by industry experts in line with developing regulation.

Informal economy: Economic activities, enterprises, jobs and workers that are not covered in law or practice by formal arrangements.[20]

Low- and middle-income countries (LMICs): Economies with a GNI per capita of $14,375 or below as of 1st July 2026.[21]

Stakeholder engagement to shape regulation

The considerations outlined in this paper provide a starting point for adoption of best practice design in LMICs. For implementation in local industry guidelines and eventually legislation, several stakeholder groups will require consultation:

Table 1: Key stakeholders will help shape design regulation

Group	Input on guidelines
Waste pickers' associations	■ Practical detail of processes including manual sorting and transport ■ Market dynamics that influence what is collected and sold to recyclers
Producer groups	■ Detail of packaging currently being put on the market ■ Motivations and / or barriers for implementation of guidelines including feasibility of changing / updating design ■ Perspective of voluntary PROs where applicable (e.g., IPRO, Indonesia)
Industry bodies	■ Existing design for recycling guidelines that may be more tailored to local markets & infrastructure (e.g., guidelines published by ABIPLAST, Brazil) ■ Approaches / guidelines that have worked well in other markets
Regulators	■ Existing regulatory landscape including EPR frameworks and eco-modulation of fees ■ Enforcement mechanisms and / or barriers to enforcement
Recyclers' associations	■ Local infrastructure realities; e.g., recycling of green PET and polystyrene is variable between markets ■ Technology implemented locally; e.g., balance of manual vs NIR sorting may influence detailed guidelines on inks and colours
Clean-up groups	■ Environmental considerations including contributors to environmental leakage and how design guidelines can mitigate environmental pollution
End consumers	■ Understanding of on-pack labelling and recycling instructions; e.g., which wording, symbols and languages are understood locally and prompt correct disposal ■ Household disposal and separation behaviours; e.g., barriers to sorting and how these vary with local collection systems

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