



# Films and flexible packaging: challenges of adding recycled content

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# Chapter 1: Introduction



Global plastics production has surged over the past 70 years, and is expected to reach 34 billion metric tonnes by 2050.<sup>1</sup> Globally, packaging is, and will remain the largest application of plastics.<sup>2</sup>

Flexible plastic packaging is the fastest growing plastic packaging category: globally, its market is expected to increase from 27 million tonnes in 2016, to 38 million tonnes in 2026.<sup>3</sup> This growth can be attributed to several benefits of flexible packaging formats over rigid ones, including their lighter weight, higher product-to-packaging ratio, and lower price points. Flexible plastic packaging is mostly single-use, with very low recycling and high leakage rates: in the Indian context it is one of the most challenging plastic packaging formats in the journey towards a circular economy for plastics.

The relative share of flexible packaging in plastic packaging is higher in countries such as India due to its relatively low cost and versatility. In 2018, a total of 15.4 million metric tons (MMT) of plastics was consumed in India; 59% of this went into

packaging (by weight), out of which 71% went into flexible packaging (by weight).<sup>4</sup> By comparison, flexible packaging accounted for only one-sixth (approximately 17%) of the packaging material used (by weight) in Europe.<sup>4</sup> In India, flexible packaging is also commonly used for small format packaging (<50 ml or 50 g in size): three out of four FMCG products sold in India are packaged in such formats.<sup>5</sup>

While the collection and recycling of most flexible packaging is limited, some flexible packaging such as PE shrink wraps and LDPE milk pouches do get collected and recycled. Recent amendments to India's Plastic Waste Management Rules (specifically, via the Extended Producer Responsibility (EPR) Guidelines in 2022<sup>6</sup>) have provided a clear policy direction to businesses for a circular plastics economy; this is expected to result in the growth of collection and recycling of flexible packaging. The Guidelines set out targets for recycling, ranging from 30% to 50%, and inclusion of recycled content in packaging, ranging from 5% to 20%, for flexible formats.<sup>7</sup>

<sup>1</sup> Pew Charitable Trusts (2020). Breaking the Plastic Wave. <https://www.pewtrusts.org/en/research-and-analysis/articles/2020/07/23/breaking-the-plastic-wave-top-findings>

<sup>2</sup> World Economic Forum (2016). The New Plastics Economy: Rethinking the future of plastics. [https://www3.weforum.org/docs/WEF\\_The\\_New\\_Plastics\\_Economy.pdf](https://www3.weforum.org/docs/WEF_The_New_Plastics_Economy.pdf)

<sup>3</sup> Smithers (2021). The Future of Global Flexible Packaging to 2026. <https://www.smithers.com/services/market-reports/packaging/future-of-global-flexible-packaging-to-2026>

<sup>4</sup> CEFLEX (2020). Designing for a Circular Economy. <https://guidelines.ceflex.eu/>

<sup>5</sup> India Plastics Pact (2022). Insights report: small formats and sachets. [http://indiaplasticspact.org/wp-content/uploads/2023/03/Small\\_Formats\\_and\\_Sachets\\_Insight\\_Report\\_IPP.pdf](http://indiaplasticspact.org/wp-content/uploads/2023/03/Small_Formats_and_Sachets_Insight_Report_IPP.pdf)

<sup>6</sup> Ministry of Environment, Forest and Climate Change, Government of India (2022). Guidelines on Extended Producer Responsibility for Plastic Packaging. G.S.R. 133[E]. <https://egazette.nic.in/WriteReadData/2022/233568.pdf>

<sup>7</sup> Ministry of Environment, Forest and Climate Change, Government of India (2022). Guidelines on Extended Producer Responsibility for Plastic Packaging. G.S.R. 133[E]. <https://egazette.nic.in/WriteReadData/2022/233568.pdf>

Achieving the EPR targets will require collaborative action by stakeholders across the value chain. The India Plastics Pact (IPP) initiative launched in September 2021, is a collaborative platform, unifying businesses, non-governmental organizations (NGOs) and citizens to rethink the

way plastic packaging is designed, used and reused. As the first Plastics Pact in Asia, IPP joins a global community of 14 Plastics Pacts. All signatories of the India Plastics Pact work collaboratively towards achieving the following four ambitious targets by 2030:

<p><b>Target 1</b> </p> <p>Define a list of unnecessary or problematic plastic packaging items and take measures to address them through redesign and innovation</p>	<p><b>Target 2</b> </p> <p><b>100%</b> of plastic packaging to be reusable, recyclable or compostable</p>
<p><b>Target 4</b> </p> <p><b>25%</b> average recycled content across all plastic packaging</p>	<p><b>Target 3</b> </p> <p><b>50%</b> of plastic packaging to be effectively recycled</p>

Target 4, supported by the other targets, encourages closed-loop recycling of plastic packaging, maintaining high material quality throughout the plastics value chain, and increasing demand for recycled content.

Since flexible formats dominate the Indian market, unlocking progress towards Target 4 will require a better understanding of the challenges of adding recycled content in films and flexibles.<sup>3</sup> This document aims to identify these challenges.



# Chapter 2: Challenges of adding recycled content in films and flexibles



India's FMCG sector has been steadily growing over the years, with revenues reaching USD 110 billion in 2020.<sup>8</sup> Food and beverage products commonly packed in flexible packaging include pulses, rice, spices, milk, curd, oil, chips and biscuits. Personal care products such as shampoo, hair oil and handwash are also sold in flexible packaging.

A 2015 study,<sup>9</sup> which categorized FMCG into staples (pulses, cereals, dairy, edible oils, fats), beverages, packaged food, consumer health, home and personal care, showed that the food and beverages segment contributed about 89% of the FMCG sector's revenue, while the home and personal care, and consumer health segments contributed only 9% and 2%, respectively.

The study also showed that the majority of FMCG sales in India (≈66%, in terms of revenue) are unbranded (both loose and packaged). The packaging is likely to be supplied by scattered, small-scale manufacturers for whom cost is the primary consideration; a variety of packaging compositions are therefore placed on the market. These are usually not designed for recyclability, preventing closed loop recycling for flexible packaging.

This document identifies challenges<sup>10</sup> at different points (design, use, collection, and recycling) in the plastics value chain which make the addition of recycled content in films and flexibles very challenging. Other challenges, for example relating to end-markets for recycled content, have also been identified.



<sup>8</sup> IBEF. (2022). Fast Moving Consumer Goods (FMCG). [https://www.ibef.org/download/1664768056\\_fmkg-august-2022.pdf](https://www.ibef.org/download/1664768056_fmkg-august-2022.pdf)

<sup>9</sup> BCG and CII. (2015). Re-imagining FMCG in India. <https://media-publications.bcg.com/india/Re-Imagining-FMCG-in-India.pdf>

<sup>10</sup> Challenges were identified in two ways: during meetings of the Collaborative Action Group 4, which specifically addressed this topic and at which brands, recycler, converters and WMOs were present; during structured interviews with the above-mentioned stakeholders across the value chain.



## Design

### 1. Use of problematic polymers

Problematic and difficult-to-recycle polymers such as PVC and PS are often used in flexible packaging applications such as shrink wraps, pallet wraps, overwraps, bottle labels, and bottle shrink sleeves. Commercial recycling of certain polymers (such as PS) is unviable because of their relatively low use in packaging placed on market in India. Others, such as PVC are problematic when mixed with PET waste streams because their densities are similar and separation in sink-float tanks in a recycling facility is not possible. PVC thus contaminates the PET stream and generates hydrochloric acid during recycling.<sup>11</sup> Rationalizing and standardizing polymer choices for flexible packaging will help recyclers.

### 2. Presence of incompatible polymers/materials in multilayer flexible packaging

Use of multi-layer packaging may be necessary in applications where, for example, food is in direct contact with the packaging and the packaging provides a barrier, preventing food spoilage. Often, the layers used in multilayer packaging belong to different polymer families, such as in PET-PE or PET-PP structures, and/or consist of a polymer-metal layer. These layers are difficult to separate and are not compatible when processed together: for example, PET and PE have different melting points, which leads to quality losses in the recyclate.

### 3. Highly decorated packaging

Flexible packaging is commonly decorated using inks and strong colours for brand differentiation and marketing. Often, print is enclosed between polymer layers which makes de-inking difficult. Without de-inking the recyclate is discoloured and this limits end use applications.

### 4. Presence of adhesives

Depending on the method of manufacture, multi-layer flexible packaging can be produced by adhering layers together. The adhesives used are hard to remove and can remain in the recyclate, affecting its quality. Adhesive used to attach labels can also affect recyclate quality if it is not easily removable in the recycling process.



## Use

### 1. Dominance of flexible packaging in food industry

The food and beverage industry consumes a large proportion of flexible packaging. Standards guiding the use of recyclate in such packaging do not exist (e.g. from FSSAI) while technologies for decontamination and processing are still being tested in the Indian context.

### 2. Removal of residual content

Post-consumer flexible packaging often contains residue from the packaged product (such as tomato ketchup, shampoo) which is hard to remove and adds to the recycler's cost of cleaning and decontamination.

<sup>11</sup> Mechanical Recycling of PCV Wastes (2000). Study for DG XI of the European Commission. [https://ec.europa.eu/environment/pdf/waste/studies/pvc/mech\\_recylce.pdf](https://ec.europa.eu/environment/pdf/waste/studies/pvc/mech_recylce.pdf)



## Collection

### 1. Lack of segregation at source

Segregation at source is not practiced at scale in India resulting in contaminated waste streams and reducing the quality and quantity of feedstock available for recycling. The need to manually segregate waste at a recycling unit increases processing costs for a recycler.

### 2. Poor collection rates

Flexible formats are not collected at scale by waste collectors because<sup>12</sup>:

- a. the time taken by waste collectors to collect sufficient quantities is not commensurate with the value of waste packaging collected.
- b. end markets for recyclate are not well developed resulting in low value.

### 3. Lack of awareness and communication amongst stakeholders across the plastics value chain

Information about design changes by brands, such as a switch from multi-layer to mono-layer flexible packaging, does not trickle down to waste collectors and recyclers, preventing the collection and recycling of flexible packaging which is recyclable.

## Recycling

### 1. Lack of recycling infrastructure in the country

The installed capacity for high-quality film recycling is relatively low in the country, but there are clear indications of significant expansion and growth. Much of the output from the best film recycling plants does not go back into primary contact films but to shrink films and pallet wraps.

### 2. Presence of odour in recyclate

Flexible packaging in direct contact with products such as soap and food, can absorb odour from the product. These odours are persistent and limit end-markets.

### 3. De-inking of flexible packaging

While de-inking technology is not widely available or in widespread use, the types of ink and printing processes used in packaging also vary (sometimes combinations of processes such as conventional inks with UV curing). These variations reduce the efficiency of de-inking even where technology is available and can limit end markets for recyclate.

### 4. Adding recycled content to BOPP films

Many businesses have transitioned from hard-to-recycle multilayers to mono-material BOPP layers, which are more recyclable. However, the stretching properties of BOPP coupled with the fact that they are used in thin layers, makes it hard to add recycled content in BOPP films.

### 5. Hesitation among packaging manufacturers to modify machinery

Addition of recycled content into packaging requires minor modifications (changes in machine operation parameters such as speed and temperature) by packaging manufacturers (converters) which many medium and small converters hesitate to make owing to low demand.

<sup>12</sup>Flexible packaging formats are collected in some parts of the country, but at a lower rate than that for rigid packaging.



## End markets

### 1. Lack of awareness of suitable applications

Many stakeholders are not aware of the range of potential applications for recycled content: for example, it can be readily used in overwraps, secondary or tertiary packaging.

### 2. Lack of willingness to pay premium for high-quality recyclate

Even though high-quality recyclate is available in India, many businesses in India are not keen to pay premium prices for it; recyclate of high quality is mostly exported to overseas brands and retailers ready to pay the premium.

### 3. Variation in appearance of packaging with recycled content

The addition of recycled content back into flexible packaging may lead to:

- a. variations in colour (especially when the packaging is transparent or lightly coloured)
- b. formation of gels and bubbles in the final packaging
- c. difficulty in printing on the final packaging.

All the above outcomes affect the appearance of the final packaging which might result in a lack of acceptance among consumers.

## Miscellaneous

### 1. Availability of technically skilled personnel

Skilled workers with experience in handling and processing recycled material, and operating machinery are required.

### 2. Lack of standards accompanying regulation

Absence of standards holds back use of recycled content in many end-use sectors such as food and pharmaceuticals, which are important applications of flexible packaging. Technology and machinery able to meet such standards at the scale required are also not currently available.



# Chapter 3: Outlook and next steps



## Outlook

While the challenges outlined are numerous and complex, there are encouraging signs, both in India and internationally, that the recycling of films back into packaging is the focus of innovation, investment, and progress.

In Europe, there is a rapidly growing number of major brands and retailers not only designing recyclable flexible packaging, but also incorporating PCR into primary and particularly secondary film packaging in the form of shrink wrap and stretch wrap. Primary packaging applications are mostly non-food and in products such as wraps around toilet paper, multi-packs of drinks and household products. This trend has helped the development of a growing film recycling sector.

In India, there are also very promising examples of brands and recyclers collaborating to advance film recycling.

## Next steps

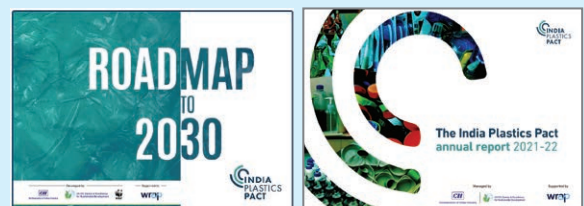
The number of units of flexible packaging placed on the market in India and other countries with similar socio-economic features is large. The new EPR regulations set quantitative targets for incorporation of recycled content into flexible packaging (5% to 20%) clearly pointing to the importance of understanding specific challenges for incorporation of recycled content back into to flexible packaging.

While this document lists some high-level challenges, a deeper evaluation is needed. Over the next year, the India Plastics Pact will:

- prepare a Films and Flexibles Roadmap to holistically map out interventions and actions needed to transition to a circular economy for flexible plastics
- develop a guidance for designing recyclable flexible packaging
- curate sessions to build capacity of stakeholders across the value chain.
- continue to support IPP member to adopt recycled content in their film packaging by sharing potential innovations or funding calls that might help accelerate investment in this area.
- continue to foster exchanges of innovation and best practice between Plastics Pacts globally to determine if/how India can learn from other markets on how to increase recycled content in flexible packaging.

Alongside the inclusion of recycled content, the IPP is also seeking to support the understanding and growth of refill and reuse models (Target 2).

## Useful links





## About the India Plastics Pact

The India Plastics Pact, launched in 2021, unites businesses, governments, NGOs and citizens to create a circular plastics economy in India. It was developed by Confederation of Indian Industry (CII) and WWF India. The CII-ITC Centre of Excellence for Sustainable Development (CESD) anchors the India Plastics Pact, within CII. The initiative is supported by WRAP, a global NGO based in the UK.

It is the first Plastics Pact in Asia. As of June 2023, there are 14 Plastics Pacts spread across the globe. As of August 2023, 50 organizations are currently part of the India Plastics Pact. The Pact works on all plastic resins at all stages of the plastics value chain.



Confederation of Indian Industry

## About Confederation of Indian Industry

The Confederation of Indian Industry (CII) works to create and sustain an environment conducive to the development of India, partnering Industry, Government and civil society, through advisory and consultative processes.

For more than 125 years, CII has been engaged in shaping India's development journey and works proactively on transforming Indian Industry's engagement in national development. With its extensive network across the country and the world, CII serves as a reference point for Indian industry and the international business community.

As India strategizes for the next 25 years to India@100, Indian industry must scale the competitiveness ladder to drive growth. CII, with the Theme for 2023-24 as 'Towards a Competitive and Sustainable India@100: Growth, Inclusiveness, Globalisation, Building Trust' has prioritized 6 action themes that will catalyze the journey of the country towards the vision of India@100.

With 65 offices, including 10 Centres of Excellence, in India, and 8 overseas offices in Australia, Egypt, Germany, Indonesia, Singapore, UAE, UK, and USA, as well as institutional partnerships with 350 counterpart organizations in 133 countries, CII serves as a reference point for Indian industry and the international business community.



## About WRAP

WRAP is a UK based international resources and climate action NGO working around the globe to tackle the causes of the climate crisis and give the planet a sustainable future. WRAP is working with businesses across the plastics value chain globally through the Plastics Pact network, transforming how we make, use, collect, sort, reuse and recycle plastics to create a circular economy.

WRAP set up, and manages, the UK Plastics Pact. Established in 2018, in partnership with The Ellen MacArthur Foundation, it has catalyzed 13 further Plastics Pacts to be developed including South Africa, US, Chile, Kenya and Colombia. WRAP was instrumental in establishing the India Plastics Pact with CII and WWF-India. The Plastics Pact network encompasses over 1,000 leading plastics businesses in their membership. WRAP provides operational and technical support to the India Plastics Pact and other Pacts. WRAP also runs a knowledge sharing platform between the various circular plastics initiatives internationally.

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## About UKRI

UK Research and Innovation (UKRI) was launched in April 2018. It is a non-departmental public body sponsored by the Department for Business, Energy and Industrial Strategy (BEIS). It brings together the seven disciplinary research councils, Research England, which is responsible for supporting research and knowledge exchange at higher education institutions in England, and the UK's innovation agency, Innovate UK. UKRI's nine councils work together in innovative ways to deliver an ambitious agenda, drawing on our great depth and breadth of expertise and the enormous diversity of our portfolio. Through our councils, we maintain and champion the creativity and vibrancy of disciplines and sector specific priorities and communities. Our councils shape and deliver both sectoral and domain-specific support. Whether through research council grants, quality related block grants from Research England, or grants and wider support for innovative businesses from Innovate UK, we work with our stakeholders to understand the opportunities and requirements of all the different parts of the research and innovation landscape, maintaining the health, breadth, and depth of the system.

The logo for the India Plastics Pact features a stylized 'C' composed of three concentric, curved lines in shades of teal and blue. To the right of this symbol, the words "INDIA", "PLASTICS", and "PACT" are stacked vertically in a bold, dark blue, sans-serif font.

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