Report

Roland Berger

MUNICH / GERMANY

Recycling of Paper-Based Hybrid Packaging

NEW CHALLENGES AND BUSINESS OPPORTUNITIES FOR PACKAGING MANUFACTURERS

Roland Berger

MANAGEMENT SUMMARY

Manufacturers of drinking cups, food containers and other packaging products made of paper reinforced with barrier coatings have to embrace recycling to remain competitive.

Regulators and consumers all over the European Union are raising the pressure on fast-moving consumer goods (FMCG) manufacturers to fully integrate this increasingly popular packaging type into the circular economy. FMCG companies are in turn demanding that packaging suppliers help solve a sustainability issue that is a real drawback for a material otherwise prized for reducing the use of plastics and glass: extremely low recycling rates. The reason? The technical difficulty of processing these thin laminates of paper and (usually) plastic and the resulting need for their separate collection. The packaging industry has no time to lose. The EU will substantially increase recycling targets for paper and cardboard by 2030 – a goal that can only be achieved with a dramatic increase in the processing of such "hybrid" packaging types. That means packaging suppliers will have to build recycling into their business models so they can help their customers rise to the EU's challenge.

The recycling of packaging materials will shift from being largely the responsibility of product manufacturers to being a joint commitment with packaging manufacturers. As a result, the packaging industry will have to play a major role in developing large-scale systems to collect and recycle hybrid material. Hybrid-packaging makers will no longer simply supply their products, they will support their customers from product delivery to recovery of their materials. Packaging made of paper and barrier coating is a commodity product, so only suppliers with a proactive recycling approach can develop a real edge in this fiercely competitive market.

FAST FACTS & CONTENTS

2021

<8 %

of paper-based barrier-coated packaging used in the EU is currently collected and recycled

2030

>50 %

of these "hybrid" materials must be captured to ensure that EU recycling targets are met

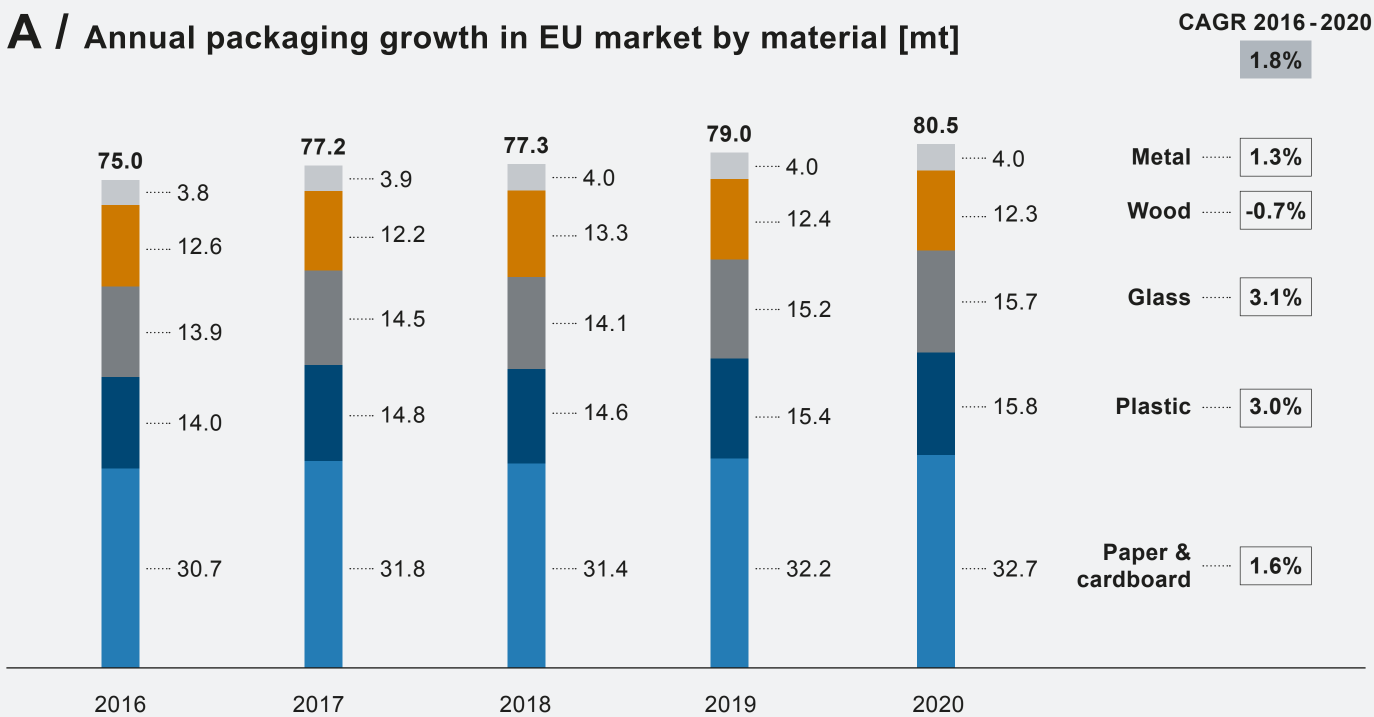
1 / Introduction – use of paper-based hybrid packaging is steadily on the rise

Cups, boxes and wrappers contain, protect or promote whatever they envelop – until they are discarded. As a result, they have been eyed with more misgiving than assurance by the environmentally aware for many years. And signs of accelerating climate change are only adding more urgency to efforts to make packaging more sustainable. In an era of proliferating waste- and emissions-reduction targets, packaging appears to be in a bind.

Plastics, glass and metal require huge amounts of energy to manufacture and recycle – if they are recycled at all. Of all packaging materials, only wood and paper are naturally occurring, renewable materials that address the sustainability issues of other packaging types. Rising consumer awareness and regulatory measures – like the European Union's mid-2021 ban on certain single-use plastic items – have seen paper packaging profit. Although making paper demands energy and creates emissions, it is eminently recyclable.

As a result, paper is in particular replacing plastics in the important food-packaging sector. Growth driven by substitution is also being bolstered by "to go" consumption and home delivery trends that are driving the food-packaging market. As it gains market share from other packaging materials in a growing market, paper will grow faster than the EU packaging market as a whole. Paper-packaging volumes are expected to grow an annual 3.1 % in the decade to 2030 – and those of barrier-coated paper packaging even 4.1 %. → **A,** → **B,** → **C**

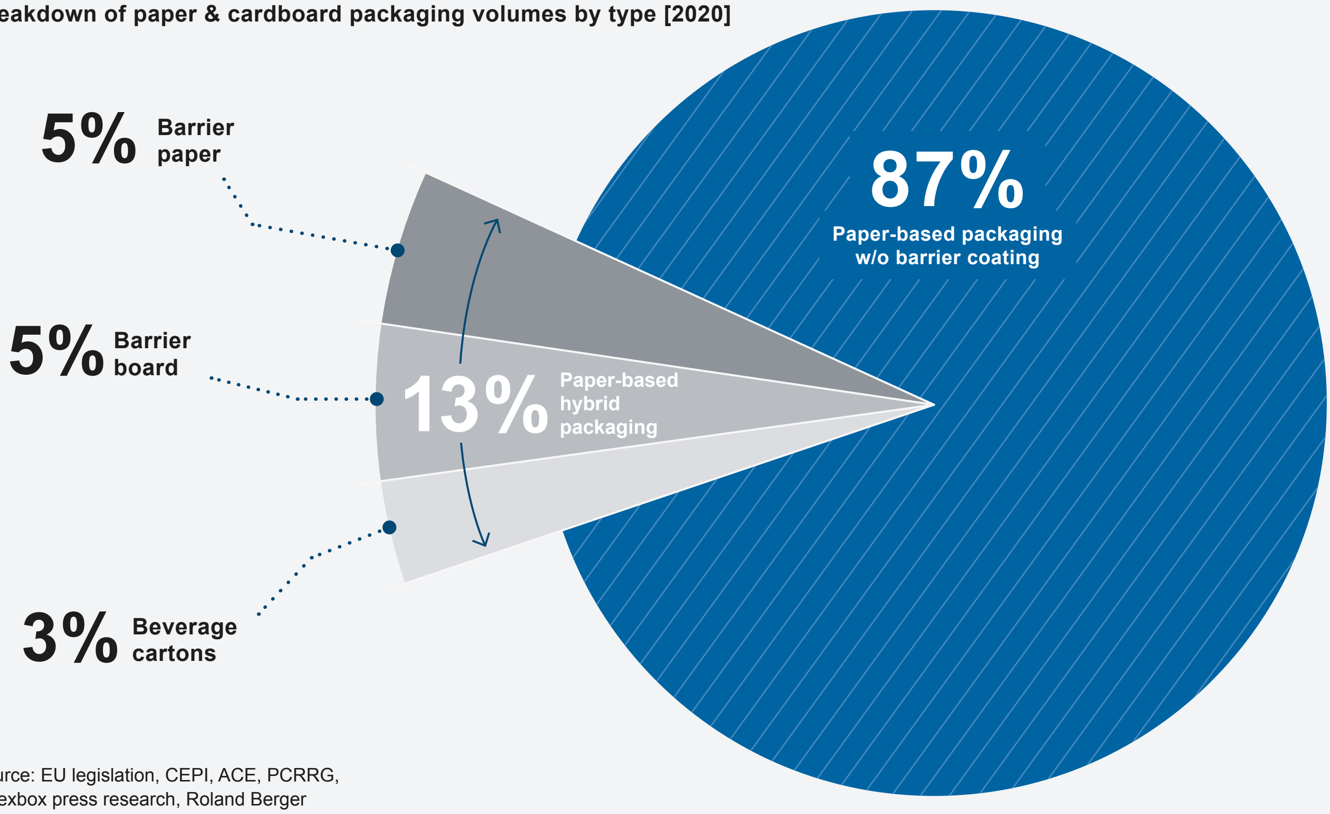
A / Annual packaging growth in EU market by material [mt]



Source: Eurostat, Roland Berger research

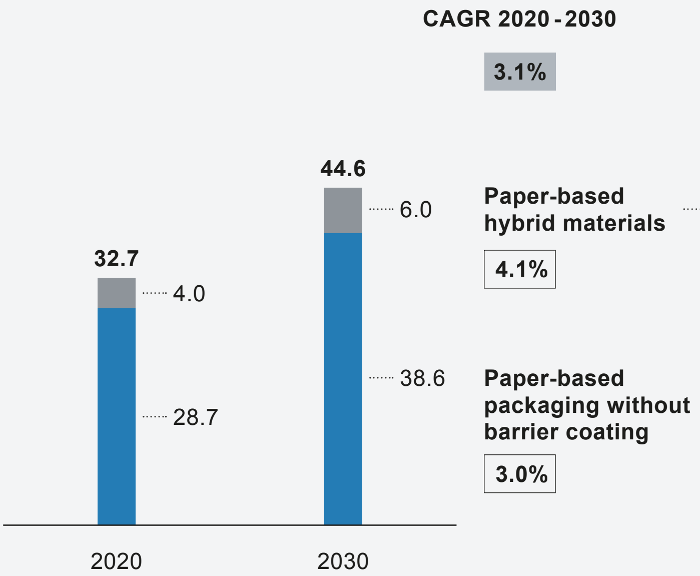
B / Paper-based hybrid materials currently have a share of ~13% of paper & cardboard packaging

Breakdown of paper & cardboard packaging volumes by type [2020]



Source: EU legislation, CEPI, ACE, PCRRG, Indexbox press research, Roland Berger

C / Outlook paper & cardboard packaging volumes, by type [mt]



Source: Eurostat, Roland Berger research

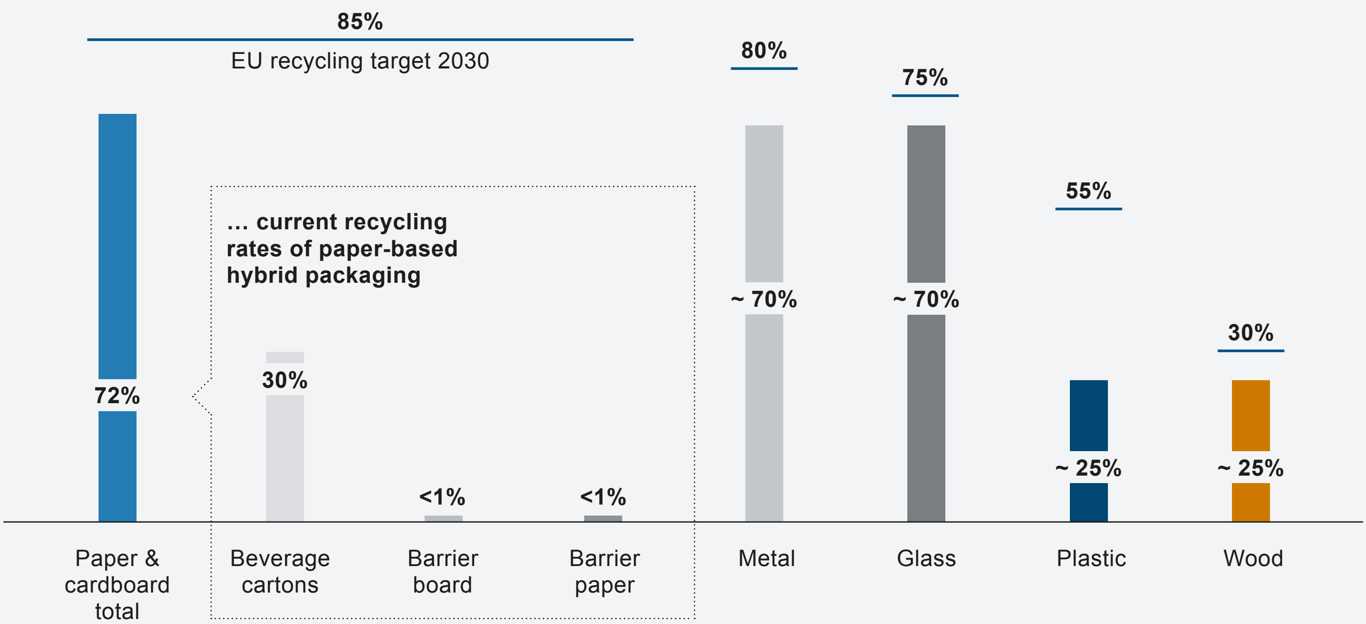
This hybrid packaging mimics the stand-out characteristics of plastics – stopping liquids, moisture and grease – with a barrier coating, commonly of polyethylene, but also of paraffin wax or aluminum, on one or both sides of the paper. It is used to make beverage cartons, barrier boards for paper cups and fresh-food boxes, and barrier papers for thin and flexible food packaging. Paper-based hybrid packaging already constitutes 13% of all paper-based packaging – and its share looks set to increase as it outpaces an already growing market.

2/ Hybrid packaging cuts plastics use – but also has one big sustainability issue

Aside from lower volumes through improved design and more efficient use of material, recyclability is the determining factor of the sustainability of packaging. The popularity of paper is driven by the ease with which it can be recycled – and the problem with its barrier-coated derivatives is that they are harder to process in this way. For all their advantages over plastics and glass, hybrid materials are a lot less sustainable than they are taken to be. → D, → E

D / Despite the increasing importance, current recycling rates of paper-based hybrid packaging in the EU are still very low

EU packaging recycling rates[1], by packaging material type [2019, %][2]



1) As per the new measurement method, to be enforced from 2022/23, accounting for recycling-process losses
2) Current EU recycling ratios and targets according to new EU measurement scheme (adjusted for material-specific recycling losses)
Source: EU legislation, Eurostat, ACE, PCRRG, Indexbox press research, Roland Berger

E / Low recycling rates of paper-based hybrids caused by lack of collection chains and limited consumer awareness

Current EU collection schemes for paper and hybrid materials (key countries)

			Paper-based hybrid packaging materials			
	Board boxes, folded cartons, corrugated boxes, …	Envelopes	Beverage Cartons	Paper cups	Coated Paper	Laminated Paper
Germany	Paper	Paper	Lightweight	Lightweight	Lightweight	Lightweight
Austria	Paper	Paper	Lightweight	Residual	Lightweight	Residual
Netherlands	Paper	Paper	Lightweight	Lightweight	Residual	Residual
Spain	Paper	Paper	Lightweight	Residual	Residual	Residual
Poland	Paper	Paper	Lightweight	Residual	Residual	Residual
Portugal	Paper	Paper	Lightweight	Residual	Residual	Residual
Belgium	Paper	Paper	Lightweight	Paper	Residual	Residual
France	Co-mingled	Co-mingled	Co-mingled	Co-mingled	Co-mingled	Co-mingled
Great Britain	Co-mingled	Co-mingled	Co-mingled	Residual	Residual	Residual
Greece	Co-mingled	Co-mingled	Co-mingled	Residual	Residual	Residual
Sweden	Paper	Residual	Paper	Paper	Paper	Co-mingled
Norway	Paper	Paper	Paper	Residual	Residual	Paper
Italy	Paper	Paper	Paper	Residual	Residual	Residual
Bulgaria	Paper	Paper	Paper	Residual	Residual	Residual
Romania	Paper	Paper	Paper	Residual	Residual	Residual
Czech Republic	Paper	Paper	Separate	Residual	Residual	Residual
Hungary	Paper	Paper	Residual	Residual	Residual	Residual

Paper Lightweight Co-mingled Separate Residual

Source: PROs, Environment Ministries, Regional governments, Waste operators, European Paper Recycling Council (EPRC), Roland Berger

While paper and cardboard in 2019 boasted the highest recycling rates of all packaging material in the EU, paper-based hybrid packaging had some of the lowest. While 72% of all paper packaging was recycled, less than 1% of paper cups, trays and dishes made of paper-based hybrid materials were processed in that way. Although paper-based hybrid packaging is mostly used for products that are consumed on the go or at home, widespread recycling based on municipal collection programs or private sector initiatives remains rare.

There are three interconnected reasons for this. First, recycling of hybrid paper packaging, which involves the separation of paper fibers from the plastic or aluminum coating, is technically more difficult and costly than plain-paper processing. Second, these more sophisticated recycling methods demand that hybrid waste is collected separately at its points of disposal – joint collection with paper and subsequent separation are hardly possible, and dedicated collection schemes are currently not in place. Third, consumers still pay only limited attention to a proper disposal of hybrid materials, even if separate local collection chains are established for certain material types or in specific countries.

Different national and local collection guidelines, limited waste-sorting infrastructure and recycling capacity, and low public awareness mean that most forms of paper-based hybrid packaging are still treated as residual waste across the EU – and so destined for landfills or incineration. But the record for beverage cartons shows this state of affairs can be changed. Their current EU-wide recycling rate is already 30%, and regions like Germany, Spain and the Nordic countries are even recycling every second coated-paper drinks carton of this type.

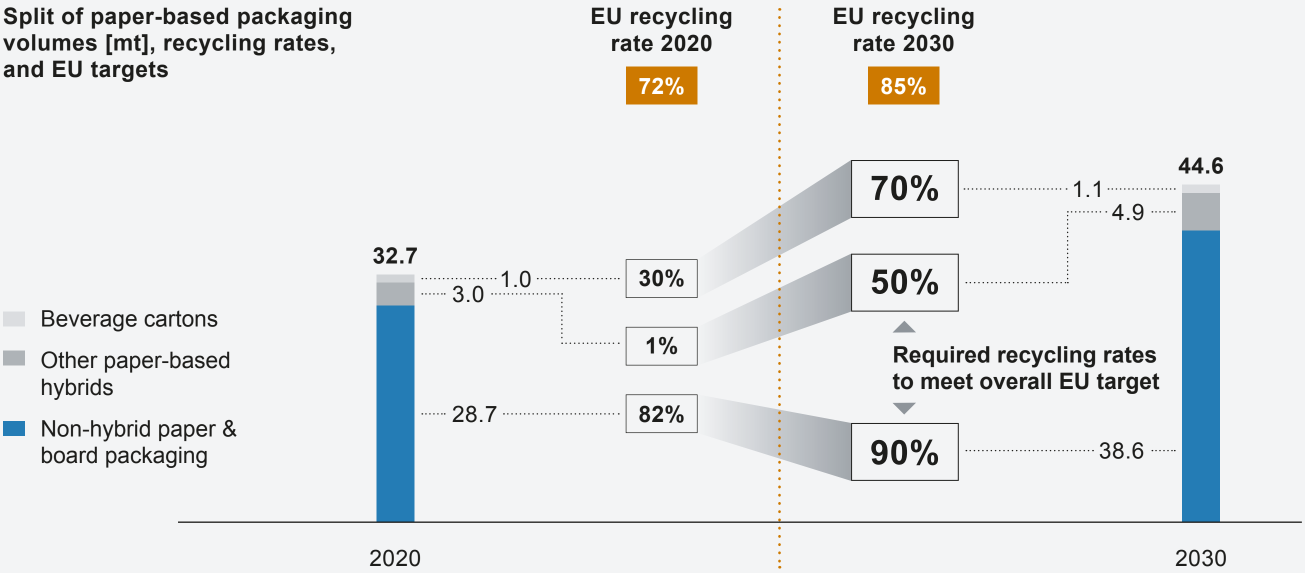
3/ Pressure will increase to recycle more and more paper with barrier coating

Recycling rates of paper-based hybrid packaging will have to rise significantly in the coming years. EU regulation will require 85% of conventional and hybrid paper packaging to be recycled by 2030 – a 12 percentage-point rise from the 2020 level. As 82% of conventional paper packaging is already being recycled, the lion's share of growth will have to come in the area of hybrid packaging. Recycling of beverage cartons will have to more than double to around 70%, and that of food trays, dishes and other items increase fifty times to 50%. → F

Crucially, these already steep targets are best-case scenarios. They are based on the assumption that recycling rates of plain-paper packaging can be raised from currently 82% to 90% in 2030. Despite the EU's success in this area in past years, securing further marginal increases will become increasingly difficult. Some material is always lost in even the best closed-loop systems through improper disposal or the need to discard dirty material that cannot be recycled. Germany, for example, has a comparatively advanced paper recycling system, but manages to recycle no more than 85% of conventional paper packaging.

F / Low recycling rates of paper-based hybrids caused by limited recycling infrastructure and lack of consumer awareness

Split of paper-based packaging volumes [mt], recycling rates, and EU targets



Source: EU legislation, CEPI, ACE, PCRRG, Indexbox press research, Roland Berger

G / EU is introducing additional regulations that will drive the recycling of paper-based hybrid packaging

Regulation aspects driving pressure to increase recycling of hybrid packaging

I. Material recyclability

> Limiting the number of materials used, ban of non-recyclable materials (e.g. plastics mixes), further driving shift towards paper-based hybrids

> Minimum fiber content thresholds for collection (e.g. 95% in DE)

II. Specific targets

> Specific EU targets for paper-based hybrids (today in place in few EU countries, e.g. PL)

> Specific EU liquid carton targets (in line with the 90% collection targets for plastic bottles in 2030), today in place in certain EU countries (DE, AT, BE)

III. Collection harmonization

> Harmonized model for separate collection (alignment on bin color, on-the-pack recyclability guidance for consumers, information campaigns)

> Stricter enforcement/sanctions of household separate collection (country infringement)

IV. Target measurement method

> New rules for measurement of recycling rates, now considering recycling process losses

> Will lead to decrease of measured recycling rates of up to 10%-pts. for paper & board and 15-20 percentage-point for plastics & paper-based hybrids

V. General targets driving collection/recycling of paper-based hybrid packaging

> Landfilling to be reduced to max. 10% by 2030, with municipal solid waste recycling target at 65%

> New reduction targets for GHG emissions of 55% by 2030 (up from 40%), also impacting waste incineration

> New tax on non-recycled plastic packaging

> Stricter waste export and intra-EU waste trade regulations

> Stricter rules for certification of recycling capacities outside EU

Source: Roland Berger, CEPI, EU Commission

To push member countries towards its ambitious recycling targets, the EU is expected to introduce other regulations that will increase the processing of paper-based hybrid packaging. They look set to include a limit on the number of materials used in hybrid packaging (and a ban on non-recyclable ones) and setting a high bar for hybrids that can still be counted as plain paper (and recycled as such). Specific targets for hybrid products could also be on the cards, for example, for beverage cartons along the lines of plastic bottles. → G

The EU is also expected to push the introduction of harmonized collection schemes for paper-based hybrid packaging. This would involve an alignment of many details of currently diverging national rules – everything from on-the-packet information for consumers via information campaigns about new recycling possibilities to garbage-bin colors.

More general EU waste targets will raise the pressure even more. Some 65% of all solid waste will have to be recycled by 2030, with only 10% still going into landfills. New targets to lower greenhouse gas emissions to at least 55% of 1990 levels (instead of 40% previously) will provide new constraints for waste incineration. A tax on non-recyclable plastic packaging is a possibility. And the EU has pledged to tighten the rules for waste exports inside and beyond the EU, and the standards for certification of recycling facilities outside the bloc.

As a result, large-scale systems to collect and recycle paper-based hybrid materials will be needed in the coming years. Sustainable barrier-coating technologies are being developed – new materials like biopolymers produced by the cells of living organisms, water-soluble aqueous polymers or biodegradable polyesters like polyactic acid. But they are unlikely to become scalable and cost competitive fast enough to help meet the EU's 2030 targets.

"Bio-based coatings are a key enabler to increase the recovery of hybrids in existing collection schemes, but technology dissemination will not be fast enough to help meet the EU´s ambitious 2030 targets."

Oliver Herweg

Partner at Roland Berger

4/ Packaging suppliers have to move into recycling to ensure competitiveness

Pressure from regulators and consumers in the EU to make paper-based hybrid packaging more sustainable will force companies to act quickly. Current regulations primarily target FMCG manufacturers for creating packaging in order to sell their end products. As a result, they have to cover the cost of national closed-loop systems – like Grüner Punkt in Germany or Triman in France – that manage the collection, recycling and disposal of waste materials.

The EU's more ambitious recycling goals mean these FMCG companies will face rising overall recycling costs and the risk of being fined if targets are missed. They will in consequence pass on the pressure to raise collection and recycling rates to their suppliers. As per-unit input costs decline when recycling rates and the re-use of materials increase, product manufacturers have a natural incentive to do so. For packaging manufacturers, rising to their customers' needs will become a way of differentiating themselves from their competitors.

As a result, hybrid-packaging recycling will shift from being mainly the responsibility of product manufacturers to being a joint priority with packaging manufacturers. Instead of simply supplying material, hybrid-packaging makers will have to support their customers by jointly tackling sustainability issues. Given that even paper-based hybrid packaging is a commodity product with fierce competition between players, packaging manufacturers that have a proactive approach to recycling will have a competitive edge over their rivals. → H

> *"Packaging suppliers have to get involved in the recycling chain if they want to keep their right to play."*
>
> **Dragos Popa**
> Principal at Roland Berger

H / Increasing sustainability pressure from regulators and end users will enforce a stronger involvement of packaging producers to keep the "right to play"

EU and national regulatory pressure for recycling of paper-based hybrid materials

○○○○○	**Packaging producers**	No targets/obligations

Increasing pressure towards packaging producers to contribute to sustainable packaging solutions

●●●●●	**FMCG Producers/ retailers**	> Recycling targets by type of packaging > Obligation to apply deposit refund system for reusable packaging

Increasing customer expectations for sustainable packaging

●●●○○	**Users (households, companies, etc.)**	Households & private companies obliged to use existing waste mgmt. infrastructure and pay authorities/waste operators
●●●○○	**Local authorities**	> Obligation to implement collection system > Targets for landfill and waste recycling
●●○○○	**Waste collectors/ operators**	No explicit recycling obligations by law (only through sanitation contracts)
●●●●○	**Recovery organizations**	Recycling obligations in line with volumes for which responsibility was taken over
●○○○○	**Post-sorting/ landfill operators**	No obligations
●○○○○	**Recyclers**	No obligations (except traceability of recycled volumes vis-à-vis targets)

Level of regulatory pressure / financial burden from EPR (Extended Producer Responsibility) fees

○○○○○ n/a → ●●●●● very high

5/ First movers are already successfully leading the way

Packaging manufacturers have a number of options to adapt to these changes. Design and labeling innovations could improve the collection and separation of waste through tracking and tracing technologies. They could improve collection rates by partnering with customers, local authorities, or other specialized companies in the circular economy to create separate collection schemes for paper-based hybrid packaging. Innovations in waste-sorting technologies could improve recovery rates from different mixed waste streams. Adaptation of existing paper mills could optimize the separation of paper fiber from barrier coatings. → I

Some packaging suppliers have already positioned themselves as first movers. They have launched pilot projects with packaging customers and other partners to collect and recycle paper-based hybrid packaging. The UK-based initiative "Simply Cups", for example, brought hybrid-packaging makers together with a coffee chain, coffee-machine makers, large users and waste-collection companies to develop a closed-loop system for coffee cups. The goal is to raise collection and recycling of paper cups to 5% from currently 1% over three years.

In Germany, a large fast-food chain teamed up with two packaging companies to collect beverage cups consumed in its stores and recycle them into toilet paper. A pilot project involving 20 branches in 2020 has since led to the scheme being rolled out nationwide – and the hope that most or all of 1200 tons of hybrid-paper cups used every year can be recycled.

I / Paper & packaging producers have various options to react on tighter targets – and generate value from packaging waste

Strategic options for producers in collection & recycling of paper-based hybrids

1. Design & labeling

Investment in developing labels with track & tracing technologies (e.g. watermarks, digital labels etc.), contributing to:

> Improvement of consumer/household awareness to separate accurately

> Improved tracking of waste across the collection & sorting chain

2. Waste collection

Co-investments in set-up of separate collection streams for paper-based hybrids at points of sale

> Household stream – partnerships with municipalities

> Commercial stream – partnerships with retailers, restaurant chains etc.

3. Waste sorting

Co-investments in enhanced sorting plants to improve recovery rates of paper-based hybrids, stemming from:

> Paper stream (esp. IT, SE)

> Lightweight stream (esp. DE, BE)

> Co-mingled/recyclables stream (esp. UK, FR, NL)

> Municipal solid waste stream (Eastern Europe)

4. Waste recycling

Co-investments to enhance/adjust existing paper mills, i.e. to ensure separation of fiber content from polyethylene and laminate (Alu)

Source: Roland Berger, Packaging Europe, Company reports

These examples demonstrate how packaging suppliers are getting involved in the recycling of hybrid materials. Doing so also creates new opportunities for them to bolster customer relationships – and to help their own value chains by securing cheaper input materials from recycling. Partnerships with logistics providers, public authorities and other supply-chain partners can also prove to be important success factors for new initiatives of this kind.

Leading hygiene paper player and fast-food chain collaborate in the recycling of annual 1.200 t of paper cup waste

Example for recycling of paper hybrids driven by leading paper player

CONTEXT

- Paper cups for beverages, milk shakes, and other barrier-coated food boxes make up 1.200 t of waste at famous fast-food chain in Germany
- Trials conducted have demonstrated the feasibility to recycle paper cups into hygienic paper
- Project started mid 2020 as pilot involving 20 branches

PROJECT AND PARTNERS

- Leading player in hygienic papers, fast-food chain, and logistics partner
- Closed-loop system (collection, recycling and reuse of recycled content)

COLLECTION AND RECYCLING OUTPUT

- Waste collected in German branches of a fast-food chain
- Successful pilot conducted, roll-out across Germany ongoing
- Logistics managed by further partner
- Paper player recycles cups into toilet paper

Source: Roland Berger

6/ Each packaging supplier will have to define its own recycling strategy

Paper-based hybrid packaging is a complex business. Hybrid packaging can be put to many uses in many markets with different volumes and economies of scale, different types of customers with a variety of expectations (for example, about disposal in store, on the go, at home) and different collection schemes. As packaging manufacturers also have distinct product portfolios and regional strengths, there is no standard strategy for them to adopt.

Each company instead has to tailor its target positioning and strategy in hybrid-packaging recycling by grappling with four key questions. How exposed it is to the paper-based hybrid packaging market? How does this positioning align with the company's own sustainability targets and strategy? What competences and resources does it have to gain a foothold in the recycling market? What options does it have for partnering with other organizations?

Strategies will be different. The business profile of each packaging supplier will play a big role in determining how quickly and radically it needs to adapt. In addition, the company's overarching sustainability strategy – driven by its own convictions as much as external regulation – will influence its ambition to take a position in recycling. Only a company with a good grasp of its strengths and weaknesses will devise a realistic strategy. Lastly, innovative initiatives are usually the result of a partnership with multiple stakeholders.

But as much as strategic approaches will differ, the early movers are likely to benefit more than the laggards. Hybrid-packaging makers should act now to help shape the future. → J

J / Paper & packaging manufacturers need to consider 4 dimensions in defining their strategy for recycling paper-based hybrid packaging

Key strategic questions/ dimensions to consider for your strategic roadmap

Exposure/ relevance of paper-based hybrids in portfolio?

Current and future product portfolio

Usage/disposal profile of products (i.e. at point of sale, household, etc.)

Geographic footprint (higher pressure in EU than in other regional markets)

Sustainability strategy/ targets?

Strategic importance of sustainability for the company/business

Sustainability direction/ pillars and (internal) targets

Must dos (regulatory-driven)

Competences and resources?

Personnel with knowledge of the field

Project track record in the field

Available investment and financing options/ headroom

Partnership options?

Key clients and demand structure

Key suppliers

Other potential partners in the packaging waste value chain

Source: Roland Berger

CONCLUSION

The packaging industry has to contend with major challenges as the world strives to cut greenhouse gas emissions to slow global warming. Manufacturers have to adopt their business models in order to bring recycling within the scope of the products and services they offer their customers. This is because FMCG makers and other industries are under growing pressure as EU recycling targets become more ambitious and region wide regulation stricter. Packaging users are beginning to pass these political and social expectations on to their suppliers – raising the sustainability of packaging by optimizing closed-loop recycling systems will become a joint responsibility. As a result, recycling will become a crucial competitive differentiator in a fierce packaging market that traditionally has been driven largely by pricing. The functions of collection, sorting, processing and disposal or re-use of recycled materials are various, the spectrum of customer needs wide, and the positioning of each packaging manufacturer distinct. This means each player will have to find bespoke answers to the challenges ahead. Roland Berger can help your company assess its current position and future needs. It can help your company conceive and implement the necessary strategic changes. Please feel free to contact our experts any time.

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