

A new horizon for fibre-based packaging recyclability

How the value chain is setting a new benchmark for sustainability through collaboration and shared purpose.

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INTRODUCTION:

For decades, fibre-based packaging has played a leading role in sustainable packaging solutions, but one persistent challenge has remained. How do we accurately and fairly assess the recyclability of diverse fibre-based packaging across various recycling processes? This question has grown increasingly urgent as the packaging sector faces new regulatory pressures, shifting consumer expectations, and rising environmental concerns. In response, the 4evergreen alliance—a cross-industry initiative representing the entire fibre-based packaging value chain—has developed the Fibre-Based Packaging Recyclability Evaluation Protocol, an evidence-based, practical tool designed to meet these challenges head-on.

This protocol is more than a technical deliverable; it represents a new model for collaborative development—bringing together over 100 stakeholders from across Europe and beyond. These contributors include paper and board producers, packaging converters, brand owners, recyclers, technology providers, and research institutions. Their shared goal was to develop a harmonised method to evaluate recyclability that is credible, consistent, and reflective of real-world recycling operations.

A Shared Vision for Circularity

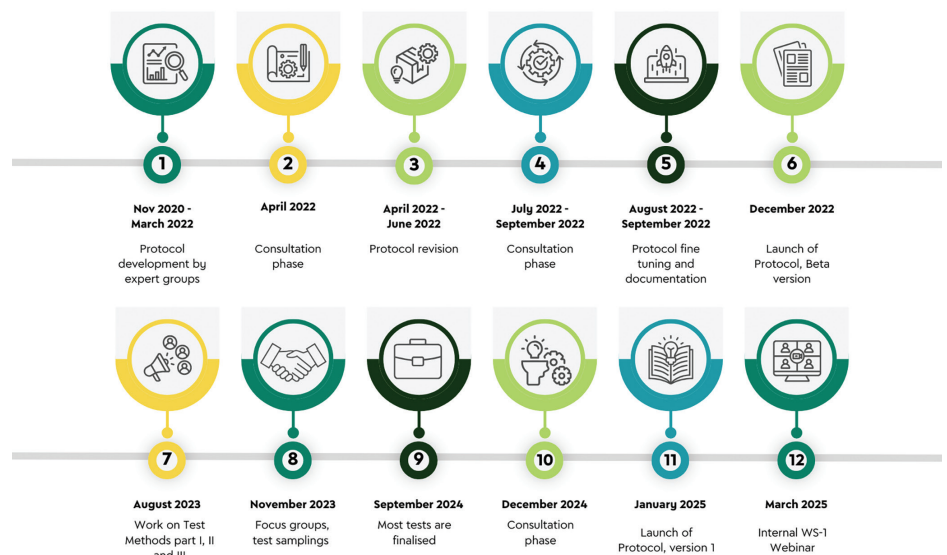
The roots of the protocol trace back to 2020, when 4evergreen members identified a fundamental gap: the lack of a common framework to assess fibre-based packaging recyclability. Despite the industry's longstanding commitment to circularity, there was no single method to determine whether different types of packaging could be recycled effectively and sustainably within existing infrastructures.

The challenge was complex. Unlike mono-material packaging, fibre-based solutions often involve combinations of materials—barrier layers, inks, coatings, adhesives—all of which can influence recyclability. Adding to the complexity, recycling technologies vary significantly across Europe. Some mills specialise in standard graphic papers, others in board or specialty grades, and their processes differ in terms of pulping, screening, flotation-deinking, and reject handling. This diversity created a fragmented landscape, in which recyclability assessments were often subjective, inconsistent, or not fully transparent.

To meet this challenge, a wide range of organisations across the fibre-based packaging sector came together under the umbrella of the 4evergreen alliance. Representing stakeholders from across the value chain, this cross-industry effort led to the development of the Fibre-Based Packaging Recyclability Evaluation Protocol. The aim was to create a practical, evidence-based approach to assess recyclability in ways that reflect both packaging progress and the realities of existing recycling processes.

Building a Common Language

The project began with the recognition that collaboration, not competition, would be the key to success. A dedicated group—Workstream 1 (WS1)—took on the technical challenge of designing the protocol.



The process involved more than three years of detailed work: from laboratory testing and pilot-scale recycling trials to expert reviews, stakeholder consultations, and iterative refinements.

The first beta version of the protocol was released in 2022. It marked a significant milestone: for the first time, the industry had access to a structured, evidence-based methodology for assessing recyclability. This beta release also generated vital feedback from both users and experts, laying the groundwork for future enhancements.

Following additional rounds of testing and consensus-building, a full version of the protocol was released in early 2025. This final version improved the assessment approach for conventional recycling mills and expanded the scope to include two new scorecards—for flotation-deinking systems and for used beverage cartons (UBC). Each of these scorecards addresses the unique challenges and requirements of different recycling processes.

How the Protocol Works

At its core, the protocol evaluates packaging recyclability using a series of measurable criteria derived from established laboratory tests and practical recycling outcomes. It assesses fibre-based packaging against four key parameters:

- **Disintegration:** the ability of the material to break down into fibrous components under typical pulping conditions.
- **Fibre Yield:** the proportion of usable fibres recovered after processing.
- **Screening Efficiency:** the removal of coarse non-paper components like plastic films or rigid parts.
- **Impurities:** the quantity and nature of residual materials that might interfere with the quality of recycled fibre.

Each test yields quantitative results, which are then interpreted using colour-coded scorecards. Green indicates high recyclability, amber signals potential issues, and red denotes materials unlikely to be recycled successfully in that process. Importantly, the protocol does not offer a single recyclability “label” or pass/fail verdict. Instead, it highlights how a particular packaging item performs across different recycling streams.

This modular, process-specific approach can adjust to the changing nature of packaging materials and recycling technologies. It allows for updates as new materials emerge and recycling capabilities evolve.

Designed by the Industry, for the Industry

The value of the protocol lies not only in what it does, but in how it was developed. The process brought together technical experts from across the fibre-based value chain—each with unique insights into their part of the recycling puzzle. These contributors included leading brands, packaging designers, mill operators, academics, and technology specialists.

Crucially, the collaborative model enabled the group to address divergent views and develop shared definitions. For example, what constitutes a “recyclable” barrier layer in one mill might be problematic in another. By testing real packaging materials in real-world scenarios, the group was able to move beyond theoretical debates and ground its conclusions in evidence. This consensus-driven approach ensured that the protocol would be both credible and practical. The extensive testing campaigns—some conducted at industrial pilot facilities—also helped validate that the protocol could be applied at scale.

The diversity of participants also brought resilience to the process. Rather than representing a single viewpoint, the protocol reflects the realities faced by converters, brands, recyclers, and material providers alike. In doing so, it offers a more balanced, equitable approach to assessing recyclability—one that doesn’t favour one technology or product category over another, but instead builds a level playing field rooted in evidence.

Supporting Regulatory and Design Needs

The release of the protocol comes at a time of growing regulatory scrutiny. New packaging and packaging waste rules across Europe are setting recyclability performance thresholds, minimum recycled content requirements, and mandatory labelling schemes.



96
member
companies

246
representatives

To comply with these regulations, producers need clear, reliable ways to demonstrate that their packaging is indeed recyclable.

The protocol offers one such pathway. It provides objective data that can support recyclability claims, inform eco-modulation of extended producer responsibility (EPR) fees, and guide design-for-recycling initiatives.

For packaging developers, the tool can highlight design features that may hinder recyclability—such as certain barrier coatings, inks, or constructions. This insight allows for earlier, more targeted interventions in the packaging development cycle, reducing reliance on trial-and-error methods.

It also offers a valuable benchmark during material development. For R&D teams, understanding how new materials or design choices might score in different recycling processes provides crucial foresight, accelerating the development of packaging that meets recyclability goals.

The protocol is not only a compliance aid—it also functions as a design reference. By using the tool at early design stages, brands can make informed decisions that align with recyclability goals from the outset. Designers and engineers alike can use protocol insights to avoid pitfalls that may only become evident at end-of-life, leading to better packaging outcomes and lower environmental impact.

Beyond the technical and regulatory applications, the protocol plays a key role in building consumer trust. With clear, data-supported assessments, companies can offer transparent communication about the environmental attributes of their packaging. This can help consumers make more informed choices and foster a deeper understanding of the recycling process itself. When people understand how and why packaging is recyclable—or not—they’re more likely to engage meaningfully with recycling behaviours. In this way, the protocol doesn’t just serve the industry, but also empowers the broader public to participate in circularity with greater awareness and purpose.

Impact Beyond the Mill Gate

Beyond regulatory compliance and packaging design, the protocol also contributes to broader sustainability goals. It strengthens the business case for improving recyclability by offering data that brands and manufacturers can use in their sustainability reporting. It also supports better communication between value chain partners—by giving them a shared language to discuss recyclability performance.

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Additionally, the protocol can inform infrastructure investment decisions. Recyclers and technology developers can use the insights from the protocol to assess which packaging types are compatible with existing equipment and where advancements may be needed. This can drive more strategic alignment between packaging development and recycling system capacity.

The protocol may also serve as a bridge between policy and practice. Regulators need tools that reflect operational realities, and this industry-developed framework provides an example of how voluntary, evidence-based initiatives can complement regulatory ambition. It allows for better alignment on expectations and outcomes, encouraging progress without compromising recyclability performance.

By fostering a more accurate understanding of how different materials behave during recycling, the protocol encourages alignment between what packaging is designed to do and what recycling systems are capable of handling. This mutual understanding is essential for achieving truly circular outcomes—ones that are economically viable, environmentally responsible, and technologically feasible.

Continuous Development and Real-World Application

Far from being a static document, the protocol is designed to evolve. As feedback is gathered from industry users and regulatory bodies, further refinements will be made. There are plans to develop additional scorecards for other recycling systems, and to explore potential links with broader environmental impact metrics, such as life cycle assessments (LCAs).

Member companies are now beginning to test the protocol against their own packaging portfolios, helping to build a shared understanding of recyclability across product categories. Looking ahead, the protocol is expected to inform future iterations of industry guidelines, contribute to alignment with EU policy frameworks, and serve as a reference point in international sustainability dialogues.

The future vision includes integration with digital tools and data platforms that could automate parts of the assessment, making

recyclability checks a seamless part of the design and production workflow. Combined with developments in artificial intelligence and big data analytics, this could enable a fresh approach to smart packaging design, where recyclability is engineered in from the very beginning.

A Collective Achievement

The success of the Recyclability Evaluation Protocol is, at its heart, a story of collaboration. It shows what is possible when diverse sectors come together with a common purpose. Instead of working in silos, participants shared data, expertise, and challenges, resulting in a tool that benefits the entire fibre-based packaging ecosystem.

It is also a model for how other sectors might approach the complexity of sustainability transitions. By combining technical rigour with open dialogue and shared goals, the protocol process helped overcome one of the major barriers to progress: the lack of mutual understanding across the value chain.

Most importantly, the protocol brings us closer to a vision of a circular economy—one in which materials are designed from the outset to be recovered and reused, and where all actors play a role in ensuring the success of that system.

Conclusion

The launch of the Fibre-Based Packaging Recyclability Evaluation Protocol marks a significant milestone for the fibre-based packaging industry. It provides not only a practical tool for improving recyclability assessments, but also a symbol of what can be achieved through true cross-sector collaboration.

By creating a shared foundation for evaluating packaging recyclability, the protocol helps bring clarity to a complex issue. It supports smarter design decisions, informs policy alignment, and enables progress across the recycling landscape through improved collaboration and practical solutions. Most of all, it exemplifies the power of collective action in solving shared challenges.

For the paper and packaging technology community, this protocol is more than a framework—it is a call to work together, continuously improve, and design with circularity in mind from the start.



+190
samples

25
data
donations

+30
sample or data
donation
providers

~180
tests within
WS1 over
several years