In recent years, the food packaging value chain has been characterised by a never-ending stream of innovations. In Belgium, Pack4Food is the driving force behind the optimisation of packaging for the food industry. The cross-sectoral approach in which all stakeholders throughout the whole value chain bundle their knowledge and expertise, proves particularly efficient. Thanks to Pack4Food, Belgium plays a leading role in international food packaging research.

Pack4Food is a consortium of research institutes and companies spanning the food and packaging industry (food producers, packaging materials producers and converters including printing, equipment manufacturers, …). “They join forces to stimulate innovation in food packaging and processes,” says director Peter Ragaert. “Pack4Food acts as a bridge builder and communication channel. A key task of our six-person team is to initiate and coordinate research and development projects with added value for companies and other stakeholders across the food packaging value chain, based on their specific needs. Our ambition is to address real packaging challenges from an independent and unbiased perspective.”

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Twenty Years of International Impact

Pack4Food, celebrating its 20th birthday in 2025, also has earned its spurs internationally. The organisation is increasingly involved in European research projects and is putting Belgium on the map as a leader in food packaging innovation.

On top, Pack4Food leads, with the support of Flanders’ FOOD and Natureef Association, the **European S3 Partnership Food Packaging**, a collaborative platform of European cluster organisations committed to business-driven innovation and investment in the European food packaging value chain. The partnership unites 19 clusters from 11 countries, representing more than 2,000 companies. It aims to facilitate the exchange of know-how along the whole food packaging value chain, thereby accelerating the introduction and implementation of new sustainable and smart food packaging technologies and innovations at an international scale. In addition, the S3 Partnership

aims to build a network of ‘living labs’ that will support companies in testing and validating their packaging solutions, for e.g. shelf life, recyclability, and intelligent packaging functions.

Roadmap ‘Food Packaging of the Future’ as a Foundation

Pack4Food’s participation in numerous national and international research projects, leading to improved packaging concepts for food, stems directly from its forward-looking vision. In cooperation with the Belgian spearhead clusters Flanders’ FOOD, Catalisti, SIM and VIL, this vision has been translated into the innovative cross-sector Roadmap ‘Food Packaging of the Future.’ Peter Ragaert: “This roadmap formulates answers to the packaging challenges of 2030. It is built on three pillars: circular packaging, smart packaging and packaging & logistics, with an overarching pillar of packaging and digitalisation.”

European Collaboration is Key!

To meet the ambitious European food packaging legislation targets for 2030, industrial stakeholders require substantial innovation and investment across the entire food packaging value chain, in which interregional and cross-sector collaboration is imperative. Therefore, the S3 Partnership initiated the Interregional Innovation Investment (I3) project **Value4Pack**, aimed at strengthening the capacity, competitiveness, and resilience of European food packaging stakeholders in addressing key societal, environmental, and economic challenges tied to the 4Rs – Refuse, Reduce, Reuse and Recycle. Over two years, Value4Pack mapped the food packaging value chain in 30 regions across 11 European countries, developed five regional roadmaps in less developed regions, and identified over 50 opportunities for interregional business and investment collaboration.

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These opportunities were compiled in an interregional report, followed by a call for cooperation proposals to turn the opportunities into concrete cases. Within 3 months,

more than 60 ideas were submitted, ultimately leading to the initiation of 16 business cases involving 26 companies, working together on material testing, distribution partnerships, and joint production initiatives across Europe. The project concluded with a successful final event on 2 October 2025, gathering 77 participants from all over Europe. Beyond presenting the business cases, the highlight was a dynamic matchmaking session, resulting in 128 one-on-one meetings that will continue to fuel interregional cooperation in sustainable food packaging.

Sustainability at the Centre

Although Pack4Food's research scope is broad, its main focus in recent years has been on sustainability. "It is true that we always approach this theme from the point of view that packaging must first and foremost ensure the required shelf life of food products," notes director An Vermeulen.

The **Multi2Recycle** VLAIO-project evaluated the balance between packaging composition of PP-based flexible films and their mechanical recyclability, aiming to recycle these foils in secondary or tertiary food packaging, as well as primary non-food applications. The project also assessed the recyclability of mixed polypropylene streams and the option to use the recycled material in new film structures, while maintaining key packaging functions like barrier properties and transport resilience. Multilayer packages with up to 40% recycled content originating from mixed polypropylene streams proved to have similar performances compared to the virgin PP-based films.

The projects **UPCYCLE** and **FibreSave** focus on plastic- and paper-based packages respectively which are currently not recyclable. Within the UPCYCLE project (Horizon Europe), a combination of physical, chemical and enzymatic processes are investigated to convert non-recyclable plastic fractions into PHA-, PLA- and furan-based plastics that can be used again as e.g. packaging materials. The FibreSave project (Interreg Flanders/The Netherlands) aims to upcycle low-grade paper and cardboard waste streams into high-quality, biobased plastics more specifically polyhydroxybutyrate (PHB) for packaging and bio-medical applications.

Looking Ahead: The Future of Food Packaging

Next to the focus on 100% recyclable packaging materials, major trends are oriented towards reusable materials, in which digital technologies and data also provide an important transformative driver for the food packaging industry.

"In the **HERPAK** project, Pack4Food together with Flanders' FOOD and Ghent University investigate the microbial and chemical food safety of reusable plastic packaging focussing on applications with extended contact time between the food and the

packaging material such as ready-to-eat meals with shelf-lives of 1 to 2 weeks or B2B food packaging," says An Vermeulen. "Several challenges are tackled such as optimizing the washing and drying process. Besides several factors influencing the uptake of odours into packaging materials are investigated."

"Currently, Pack4Food is also preparing a new project with multiple partners to introduce standardised reusable plastic trays for certain food applications in retail environments. This project focusses more on the logistic flows, consumer behaviour and business models."

Knowledge Transfer and Training

Pack4Food's contribution goes beyond research and development — the organisation also plays a key role in knowledge dissemination. Peter Ragaert: "Together with various research partners, we provide practical training on a regular basis to companies, in Dutch or English. Our offer ranges from packaging technologies such as packaging under modified atmosphere (MAP) over packaging materials such as biobased and compostable plastics, to new technologies such as active and intelligent packaging."

"A recent addition to our training offer is **Start2Pack**, a concise two-hour introduction course providing a clear and accessible overview of packaging technologies, materials and regulations to anyone taking their first steps in the world of food packaging. Because we are close to the innovation sources, we constantly optimise the training courses with the latest insights obtained from various research projects and the academia." Finally, to support its members, Pack4Food provides an international network and actively promotes cooperation through several events and networking initiatives.

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