

# CORDIS Results Pack on bio-based manufacturing

## Manufacturing technologies for bio-based materials

A thematic collection of innovative EU-funded research results

February 2026



# Contents

3

How bio-based turf, furniture and panels are built to last

5

How modular design supports the shift to bio-based composites

7

How new heating methods improve bio-based manufacturing

9

Advancing bio-based manufacturing with biomass residues

11

Making circular, bio-based thermoplastics viable for industry

13

How food and agro-industrial waste is upcycled into safer packaging, shoes, and textile materials

## Editorial

Bio-based materials from renewable biological sources provide a sustainable alternative to fossil-fuel-derived plastics while boosting a circular economy. This CORDIS Results Pack showcases six EU-funded projects supporting bio-based materials in innovative manufacturing processes.

The substitution of fossil-based materials with renewable and recyclable alternatives is crucial for achieving a successful transition to a green and circular economy. Thanks to EU-funded research and innovation, bio-based materials are transforming Europe's manufacturing industries through significant contributions to the [European Green Deal](#) and the [circular economy action plan](#).

Commercial or industrial goods comprising entirely or predominately biological products, forestry elements or renewable domestic agricultural materials are defined as [bio-based materials](#). Their purpose is to improve product sustainability, and they are primarily derived from natural and renewable elements of plant, animal or marine origin.

### A more sustainable and competitive manufacturing sector

This Pack features six EU-funded projects, which form the BIOMATTERS Cluster, a group of projects working towards the shared goal of turning sustainable, bio-based materials and manufacturing into standard practice throughout Europe.

Through new processing technologies, digital tools and validated demonstrators, the projects contained within BIOMATTERS have demonstrated that bio-based materials can match, and in some cases, even surpass the properties of conventional materials. They show that sustainable alternatives can perform equally well, while cutting greenhouse gas emissions and reducing reliance on non-renewable sources.

As well as addressing the need to reach [net-zero greenhouse gas emissions](#), the [Green Deal Industrial Plan](#) calls for a fundamental redesign of production systems. The projects in this Results Pack therefore directly contribute to achieving this ambitious target by developing new materials and processes that cut emissions and reduce Europe's dependency on imported fossil resources.

### Application of smart technologies drives improvements

Successful distribution of these technologies will enhance the competitiveness of EU industry by developing innovative, improved products and processes that address current and future societal challenges.

At the same time, promoting wide-scale cooperation across different value chains and industrial sectors will reinforce the EU's position within global markets, whilst scaling-up these technologies to create safe and sustainable commercial products.

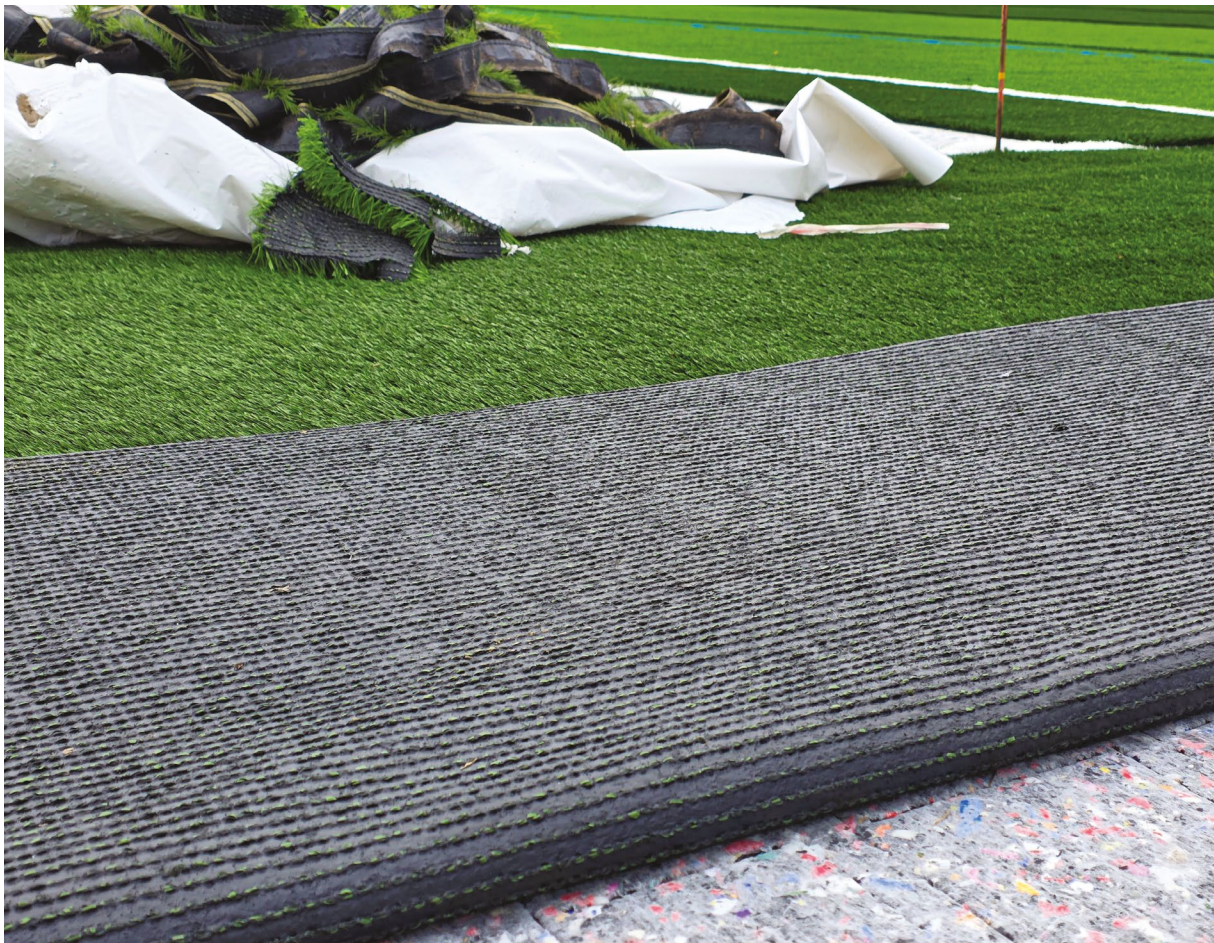
In addition, integration of smart manufacturing systems, digital solutions and AI-driven monitoring ensures that environmental impact and quality are optimised at every stage of production. This data driven approach gives industry the necessary insights to improve efficiency, reduce costs and accelerate sustainability while maintaining transparency from raw material to final product.

The six selected projects funded within Made in Europe co-programmed public-private partnership under Horizon Europe research programme showcase scientific and technological advancements and innovative applications for bio-based materials in key areas like textiles, packaging, construction, medical devices and mobility.

Their achievements will help to create new market opportunities and inspire the development of next-generation materials that are lighter, safer and fully recyclable, leading to new business opportunities and skilled jobs across multiple value chains.

# How bio-based turf, furniture and panels are built to last

Greener sports turf, outdoor furniture and building panels were developed to withstand harsh weather, and are easier to reuse, recycle and safely break down.



© hynastock.adobe.com

Cities want lower-impact products, but outdoor materials still have to survive sun, rain and heavy use. The EU-funded [AMBIANCE project](#) focused on bio-based options that can be produced reliably and tested against everyday performance expectations.

Across three demonstrators, the project combined material development, durability testing and digital manufacturing support; circular end-of-life routes were also considered from the start.

## Three demonstrators for sport, public space and construction

AMBIANCE chose products that people already encounter in daily life. Project coordinator Cristina Crespo says, “AMBIANCE is targeting three everyday ‘urban outdoor’ product families: artificial turf systems, 3D-printed outdoor furniture and decorative construction panels.”

For sports facilities, the project focused on artificial turf pitches, improving the sustainability of filaments (yarns) and infills while meeting demanding performance requirements. For public spaces, it produced 3D-printed outdoor furniture through large-scale additive manufacturing. For construction, it developed decorative panels, including self-bonded biocomposite panels made from agricultural resources such as barley straw and reed canary grass.

## Weathering tests for real outdoor stress

Outdoor ageing is a multi-stressor problem in which ultraviolet (UV) radiation, temperature cycles, moisture and mechanical wear can combine, leading to deformation, colour change, surface



*One could say that the hardest challenge is designing against combined UV and moisture effects while keeping materials circular and scalable for industrial production.*

damage or loss of strength. Crespo highlights the most challenging part: “One could say that the hardest challenge is designing against combined UV and moisture effects while keeping materials circular and scalable for industrial production.”

AMBIANCE used accelerated weathering and mechanical testing to screen materials and iterate formulations and processing. For outdoor furniture, accelerated weathering tests used controlled UV and moisture cycles with a strict pass criterion: samples had to remain undeformed and retain flexural strength within an acceptable reduction after prolonged exposure. For exterior construction panels, moisture resistance was critical and testing showed that applying a surface coating improved it.

For artificial turf fibres, accelerated solar exposure tests were conducted under controlled conditions for accelerated weathering, assessing colour stability, mechanical integrity and potential degradation. In parallel, biodegradability tests in aqueous environments were conducted on infill materials to understand degradation pathways.

## Circular end-of-life routes and a shopfloor digital twin

Circularity was applied differently across the three demonstrators because the materials and routes differ. Artificial turf systems were kept in thermoplastics as much as possible to enable mechanical recycling, while infill materials were evaluated for biodegradability. For 3D-printed furniture, recyclability was assessed even after artificial and natural ageing. For decorative panels made from agro-resources without added adhesives, chemo-mechanical recycling process was part of the intended end-of-life route.

To help manufacturers maintain quality consistency, AMBIANCE built digital solutions that link production data to shopfloor decisions. Crespo explains, “AMBIANCE’s digital solutions are designed to turn production data into actionable decisions: selecting operating windows, detecting drift and supporting consistent quality.”

This process involves cleaning and aligning sensor data, then using it in decision support systems with explainable AI so operators can see which variables drive quality. Data-driven models are combined with reduced-order models from high-fidelity simulations, letting teams test scenarios virtually before costly trials. Cost wins came from local feedstocks and material-efficient 3D printing, backed by supplier documentation and certification, where relevant, keeping durable and circular products scalable.

---

### PROJECT

**AMBIANCE - Advanced Manufacturing of Bio-Based Products for Urban outdoor applications through Innovative characterization, digital technologies and circular approach**

---

### COORDINATED BY

Aragon Institute of Technology in Spain

---

### FUNDED UNDER

Horizon Europe - Digital, Industry and Space

---

### CORDIS FACTSHEET

[cordis.europa.eu/project/id/101058406](https://cordis.europa.eu/project/id/101058406)

---

### PROJECT WEBSITE

[ambiance-project.eu/](https://ambiance-project.eu/)

# How modular design supports the shift to bio-based composites

New manufacturing processes are delivering improved bio-based composites ready for industrial use.

Bioplastics have emerged as strong contenders to replace oil-based materials in a wide range of sectors. But swapping one with the other is not straightforward: their physical and thermochemical properties differ, and a direct substitution can fall short in real-world use.

This is why the EU-funded [BIO-UPTAKE](#) project is pursuing a different route – one based on modularity and the strategic combination of bio-based components. The project's [14 partners](#) set out to boost the uptake of bio-based composites by 39 %.

After three years of research and industrial testing, the project has delivered adaptable manufacturing processes and demonstrator products for construction, medical and packaging applications.

Project coordinator Leyre Hernández explains the core idea: “BIO-UPTAKE introduces a modular concept where bio-based composites are transformed into intermediate formats – organosheets, tapes and pellets – that can be combined in multiple ways. This approach enables prefabrication of lightweight, high-performance components with reduced material waste and shorter production cycles.” By applying this modularity, manufacturers can also tailor properties to specific needs while maintaining design flexibility.

## Flexible manufacturing routes

BIO-UPTAKE's combination of different intermediate formats improved mechanical properties, durability and processability. “The union of two materials can amplify each other's strengths. For instance, organosheets add rigidity, tapes reinforce critical areas and pellets support complex shapes and large parts,” explains Hernández.



© Moses Products

These formats are the foundation for three manufacturing methods the project has developed. The first is the thermoset composites process, which uses reversible resins and vacuum bagging – removing air for better consolidation – to produce strong, lightweight panels. “These panels are made using prepregs



with flax fibres, which enhance sustainability and offer excellent mechanical properties,” she says.

The second is a highly customised thermoplastics process that uses self-reinforced tapes and pellets. It enables the production of tailored shapes and properties for small batches, ideal for medical applications.

Finally, the one-shot large-volume thermoplastics process combines preforming and injection moulding in a single operation. This speeds up production of large parts like container lids, while reducing energy use and product weight. It also incorporates reversible adhesives to enhance recyclability and disassembly potential.

“All three processes integrate real-time monitoring and digital simulation for quality and efficiency,” highlights the project coordinator.

*BIO-UPTAKE has delivered three industrial pilots, trained operators on new processes, carried out communication activities and held standardisation workshops, creating a clear pathway for adoption and scaling of bio-based composites.*

“The demonstrators proved that bio-based composites can meet technical and environmental requirements across diverse sectors,” says Hernández.

From the start of the project, sustainability was integrated through life-cycle assessment and eco-design principles. Materials were chosen from renewable or recycled sources with low-carbon production methods. All intermediate formats achieved over 75 % bio-based content, and confirmation of greenhouse gas reductions of up to 33 % is underway.

“BIO-UPTAKE has delivered three industrial pilots, trained operators on new processes, carried out communication activities and held standardisation workshops, creating a clear pathway for adoption and scaling of bio-based composites,” concludes Hernández.

## Pilot products with real-world potential

To validate the manufacturing methods, BIO-UPTAKE produced three different pilot products. In the construction sector, it developed lightweight, stiff bathroom ceiling panels that simplify installation and end-of-life recycling. In the medical area, it improved the ergonomics, comfort and sustainability of foot insoles made using the customised thermoplastics process. And in packaging, it manufactured lightweight and recyclable container lids that reduce reliance on fossil-based plastics.

---

### PROJECT

**BIO-UPTAKE - BIOcomposites in smart plastic transformation processes to pave the way for the large-scale UPTAKE of sustainable bio-based products**

---

### COORDINATED BY

Aitiip Technology Centre in Spain

---

### FUNDED UNDER

Horizon Europe - Digital, Industry and Space

---

### CORDIS FACTSHEET

[cordis.europa.eu/project/id/101057049](https://cordis.europa.eu/project/id/101057049)

---

### PROJECT WEBSITE

[bio-uptake-project.eu/](https://bio-uptake-project.eu/)



# How new heating methods improve bio-based manufacturing

New manufacturing methods using microwaves and ultrasound lead to improved bio-based materials while cutting energy use and supporting circular reuse.

The industrial sector has no shortage of sustainability targets. The harder part is turning them into materials and processes that factories can run every day with predictable quality. The EU-funded [GREEN-LOOP](#) project addressed that gap by developing bio-based alternatives and retrofitting manufacturing lines so these materials can be processed with tighter control and lower resource demand.

Under Horizon Europe's Digital, Industry and Space programme, the project designed and optimised three bio-based components: rubber panels for multifunctional applications, bioplastic bottle closures for oil, and wood-composite bearings for plastic injection machines. Alongside the materials, GREEN-LOOP looked at production, monitoring and end-of-life handling, aiming to minimise waste and improve circularity across each value chain.

## Retrofitting factory lines to process bio-based materials

Moving from fossil-based compounds to bio-based ones often exposes a fundamental problem: existing equipment was designed around predictable materials and stable processing windows. GREEN-LOOP focused on retrofitting, combining targeted upgrades with monitoring and digital optimisation so that current lines could be adapted instead of replaced.

One of the main lessons concerned sensitivity during processing. As project coordinators Luis Enrique and Ignacio Fernández explain: "Bio-based materials are often more sensitive to formulation and processing conditions than conventional ones, so achieving comparable mechanical strength or wear resistance requires tighter control and smarter design."

## Microwave and ultrasound processing for cleaner, more efficient production

GREEN-LOOP tested advanced processing methods to improve energy delivery. Microwave heating was studied for extrusion and injection moulding, using modelling to guide equipment design and support more uniform heating.

Ultrasound was integrated in multiple stages, including lignin extraction and rubber devulcanisation. By delivering energy closer to where it is needed, these approaches can shorten processing time and reduce thermal losses. In practice, the project reports energy savings, improved process control and the potential to lower emissions through these upgrades.

Materials development ran in parallel, including the use of renewable resources such as cork and bio-based polymers, such as lignin. Moreover, additives are selected to support performance in specific applications.

## Designing end-of-life routes that work outside the lab

"Improving production is only half the job if products still end up as waste," the project coordinators say. GREEN-LOOP treated end-of-life as a design constraint rather than a downstream problem. The project's life-cycle approach



*Improving production is only half the job if products still end up as waste.*



© foto/fabrics/stock.adobe.com

covered sourcing, manufacturing and use, while keeping reuse, refurbishment and recycling routes in scope from the start.

This stage proved difficult for reasons that go beyond materials science. As the project coordinators state, “Optimising material manufacture across the entire life cycle has revealed that end-of-life management is often the most challenging stage in practice.” Real-world outcomes still depend on collection systems, recycling capacity and cross-sector alignment.

In parallel, the project’s industrial demonstrations, together with the integrated assessment of performance, costs, and life-cycle impacts, also addressed a critical barrier to industrial adoption: hesitation driven by risk. The project coordinators underline that reducing uncertainty often matters more than incremental technical improvements. By pairing demonstrations with evidence throughout the life cycle, GREEN-LOOP helps decision-makers assess feasibility with greater confidence.

---

**PROJECT**

**GREEN-LOOP - Sustainable manufacture systems towards novel bio-based materials**

---

**COORDINATED BY**

IDENER.AI in Spain

---

**FUNDED UNDER**

Horizon Europe - Digital, Industry and Space

---

**CORDIS FACTSHEET**

[cordis.europa.eu/project/id/101057765](https://cordis.europa.eu/project/id/101057765)

---

**PROJECT WEBSITE**

[greenloop-project.eu/](https://greenloop-project.eu/)



# Advancing bio-based manufacturing with biomass residues

EU-funded research shows how biomass residues can replace fossil chemicals and drive circular, waste-free production.

A circular economy requires not only renewable feedstocks, but also the replacement of hazardous substances embedded in today's materials. The EU-funded [NewWave](#) project set out to introduce sustainable, bio-based raw materials into several manufacturing lines, directly substituting toxic and fossil-derived chemicals.

Using residual biomass as its starting point, the project combines conversion, product development and recycling strategies to reduce environmental impact across entire value chains. NewWave's approach is based on thermochemical fractionation (TCF). "TCF is a unique technology that unlocks biomass and makes it available for the manufacture of green chemicals and products without adding

chemicals or enzymes," explains Bert Van de Beld, NewWave project coordinator.

The first step of this process is fast pyrolysis, where biomass is rapidly heated in the absence of oxygen to produce fast pyrolysis bio-oil (FPBO). The second step fractionates FPBO based on chemical functionality, generating a reactive lignin fraction – a natural polymer found in wood – and a sugar-rich fraction, used as precursors for producing polymers and solvents.



*TCF is a unique technology that unlocks biomass and makes it available for the manufacture of green chemicals and products without adding chemicals or enzymes.*



## Replacing fossil and toxic chemicals

NewWave translated these fractions into multiple manufacturing lines, including engineered wood panels, bio-polyols for polyurethane applications, furan-based chemicals – used as alternatives to plastics, solvents and resins – and novel modified wood products. These lines address technical and market demands, building on earlier EU research, including the [Bio4Products](#) project.

A key innovation involved the substitution of phenol and formaldehyde in wood adhesives. “We successfully developed and tested medium-density fibreboard (MDF) and plywood resins using pyrolytic lignin to substitute phenol at high percentages,” says Van de Beld. NewWave also synthesised a plywood resin with 100 % substitution of formaldehyde by 5-hydroxymethylfurfural (HMF), an organic compound formed by the dehydration of reducing sugars.

In parallel, the project developed a new class of bio-based modified wood materials for construction. “They are designed to replace conventional toxic or fossil-based preservatives such as copper salts, organic biocides and creosote,” explains the project coordinator. Laboratory testing showed that the new modified wood “eliminates toxic preservatives while still achieving durability class 2 against brown rot, white rot and moulds.”

## Recovering water and energy in circular manufacturing

Wastewater treatment and water reuse are integral to NewWave’s essentially waste-free manufacturing processes. Wastewater streams generated during TCF and downstream production lines are treated using tailored combinations of biological and physico-chemical processes. This enables both water recycling within the process and energy recovery.

A major outcome is the conversion of highly concentrated industrial wastewaters into a valuable source of biogas with high methane content, supported by optimised nutrient and trace element dosing for these specific streams. “To our knowledge, the data we created is novel, and there are no existing publications demonstrating such high-efficiency conversion of industrial wastewaters into biogas,” notes Van de Beld.

Most technologies developed by the project show high technical potential, with several products reaching pilot-scale maturity. TCF is expected to become commercially available within the next years, and a first-of-a-kind FPBO fractionation unit is expected to be operational in 2027 in the Netherlands.

By exploring new routes across its technologies, NewWave clarified pathways for advancing bio-based materials. “Now, the consortium has a stronger strategic foundation, with an understanding of which markets offer genuine pull for sustainable materials and the conditions needed for commercialisation,” concludes Van de Beld.

---

### PROJECT

**NewWave – Building a sustainable  
& circular economy through innovative,  
biobased manufacturing lines**

---

### COORDINATED BY

BTG Biomass Technology Group BV  
in the Netherlands

---

### FUNDED UNDER

Horizon Europe – Digital, Industry and Space

---

### CORDIS FACTSHEET

[cordis.europa.eu/project/id/101058369](https://cordis.europa.eu/project/id/101058369)

---

### PROJECT WEBSITE

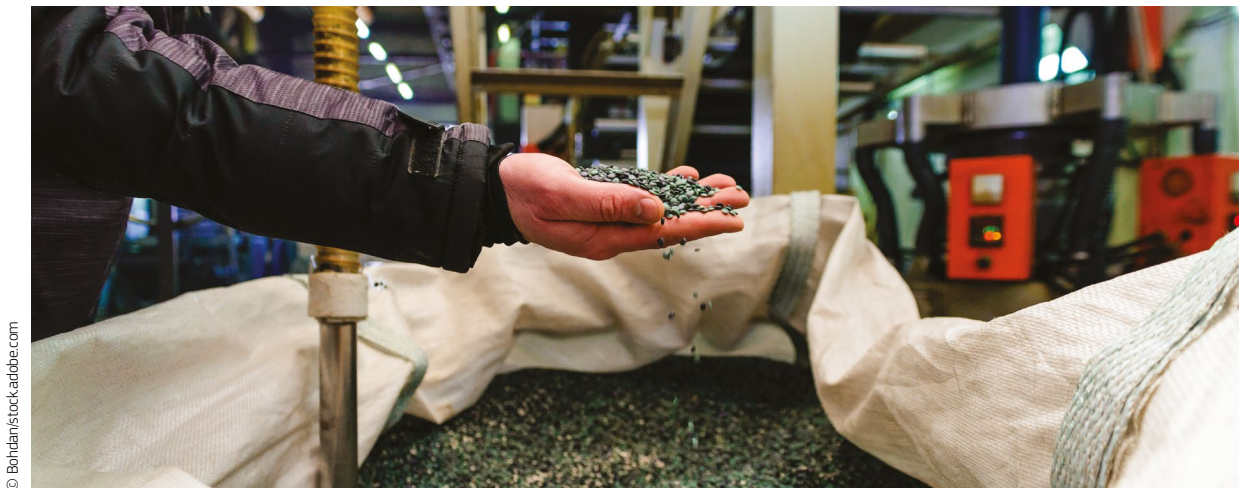
[newwave-horizon.eu/](https://newwave-horizon.eu/)

---



# Making circular, bio-based thermoplastics viable for industry

Lightweight, recyclable and scalable: new foaming technologies are bringing bio-based thermoplastics closer to industrial market adoption.



Europe's manufacturing sector is under increasing pressure to reduce its reliance on fossil-based materials while maintaining performance, cost-efficiency and scalability. The EU-funded [VITAL](#) project has taken on this challenge by delivering practical manufacturing solutions that enable the substitution of conventional plastics with bio-based alternatives within existing industrial environments.

"The transition from fossil-based to bio-based and recyclable materials is no longer optional – it is a strategic necessity," states Lisa Wikström, VITAL project coordinator.

At the heart of VITAL was the development of novel foaming processes for bio-based polymers such as polylactic acid (PLA), bio-based thermoplastic polyurethane (TPU) and a bio-based polyamide. Foaming introduces gas bubbles into a polymer during processing, reducing material use and weight while maintaining structural performance.

## Three value chains for circular bioplastics

Project partners validated the processes across three complementary value chains. The first focused on 3D foam printing. The team developed a new print head capable of processing polymer granulates directly, eliminating the need for filament production and using nitrogen gas as a foaming agent. This allows the adjustment of part density layer by layer, achieving weight reductions of up to 66 %. This technology was demonstrated through a tailored 3D-printed separation wall for cruise ships made from recyclable PLA.

The second value chain addressed low-energy bead foaming. Conventional bead foaming relies on steam, which is energy-intensive and unsuitable for many bio-based plastics. VITAL



replaced steam with radio-frequency heating, reducing energy use by up to 90 %. The process successfully produced recyclable TPU bead foams with up to 60 % bio-based content. The process was also successfully tested with PLA, opening new possibilities for cushioning and impact-resistant applications in automotive, packaging and consumer goods.

For the third value chain, VITAL focused on foam injection moulding (FIM), a high-volume manufacturing process that is particularly relevant for mechanically recyclable thermoplastics. "Here we have pioneered several developments to understand how this manufacturing process can be applied to bio-based thermoplastics, how these materials can be effectively recycled, and how the use of digital twins and machine learning process control can enhance these areas," says Wikström.

VITAL developed new durable and fire-resistant PLA grades, which are now commercially available, and demonstrated their use on industrial injection moulding lines. These demonstrations also included the testing of a machine learning process control system, which reduced energy use, improved part quality and helped cut waste.

Automotive interior parts and refrigerator components were produced using the same moulds as conventional plastics. Testing of the automotive parts showed promising results but will need further development, while unfoamed refrigerator parts met the performance requirements and significantly reduced greenhouse gas emissions.

*Foaming is  
an efficient way  
to reduce the  
required amount  
of material  
and, therefore,  
the cost.  
By reducing  
material mass,  
cutting energy  
use and enabling  
recyclability, VITAL  
demonstrates that  
sustainability and  
cost-effectiveness  
can go hand  
in hand.*

## From industrial trials to market uptake

VITAL's consortium of research organisations and industrial partners from the automotive, electronics and marine sectors ensured that the use cases reflected real application requirements. The project achieved promising results in novel foaming processes for bio-based thermoplastics, opening the way for further advancements in industrial processing, material properties and other industrial uses.

"Foaming is an efficient way to reduce the required amount of material and weight and, therefore, the cost. By reducing material mass, cutting energy use and enabling recyclability, VITAL demonstrates that sustainability and cost-effectiveness could go hand in hand in the future," states Wikström.

---

### PROJECT

**VITAL – InnoVative processing Technologies  
for bio-based foAmed thermopLastics**

---

### COORDINATED BY

VTT Technical Research Centre in Finland

---

### FUNDED UNDER

Horizon Europe – Digital, Industry and Space

---

### CORDIS FACTSHEET

[cordis.europa.eu/project/id/101058328](https://cordis.europa.eu/project/id/101058328)

---

### PROJECT WEBSITE

[vital-project.eu/](https://vital-project.eu/)



# How food and agro-industrial waste is upcycled into safer packaging, shoes, and textile materials

The EU-funded Waste2BioComp project turned organic leftovers into PHA packaging films, shoe insole foams, textile coatings, and bio-based printable inks, backed by safety and toxicity testing.



© Waste2BioComp consortium

Every year, organic leftovers from food and industrial sources are burned, landfilled or downcycled. Transforming carbon into useful materials sounds straightforward, until you try to create products that look, feel and perform like the ones people already know and trust.

The EU-funded [Waste2BioComp](#) project developed bio-based components for three everyday value chains: packaging, footwear and textiles. The work focused on polyhydroxyalkanoates (PHAs), a family of biopolymers produced by microorganisms, and on the manufacturing steps needed to convert them into demonstrators.

## Screening organic waste for high-quality PHA building blocks

Selecting the right waste stream and raw materials determines both material quality and the chances of scaling a process. As project coordinator Helena Vilaça explains, “The primary factor determining whether an organic waste stream is suitable for producing high-quality materials is its chemical composition.”

After this initial screen, the consortium assessed yield, product purity and the ease of removing impurities, alongside availability and geographical proximity. Several carbohydrate-rich streams were tested for biogenic PHA production by cyanobacteria, including glycerol, molasses, bread mix, starch, dough base and tobacco.

Different bacterial strains responded distinctively to each substrate, producing varying PHA yields and compositions. In parallel, chemical routes were explored using (potentially) bio-based molecules in order to adapt the PHA chemistry and the resulting material properties to the specific requirements of the respective material processing technology.

Gregor Grun, professor at the Kaiserslautern University of Applied Sciences, explained, "The resulting PHA materials can be tailor-made and exhibit properties ranging from rigid solids to thermoplastic elastomer (TPE)-like materials. They can be easily processed using a variety of methods (blow moulding, film casting, injection moulding, fibre spinning, 3D printing).

## From PHA polymers to packaging, insoles and textile coatings

Waste-derived does not have to mean lower quality. Waste2BioComp has benchmarked materials to ensure performance matched or exceeded conventional counterparts and carried out toxicological assessments to confirm safety. When waste streams feed microorganisms or provide chemical precursors, the resulting materials can retain quality because the fundamental building blocks can be identical to those derived from traditional sources, depending on the process implemented.

The project translated PHAs and bio-based pigments into application routes. Packaging work produced PHA films and composites with different flexibilities, while footwear work produced foams for shoe components, including PHA insole foams. Textiles were harder, partly because printing and fibre processes tend to tolerate less variation in material properties and process settings.

"Among the sectors studied – textiles, footwear and packaging – the textile industry proved the most challenging to integrate the PHAs," Helena Vilaça explains. Prototypes for shoe components and packaging films that were close to series production could be manufactured, while textiles remained at a lower technology readiness level and require further R&D.

Inkjet printing helped bridge materials and end products. The project developed bio-based pigments and inkjet inks and worked on dispersion stability and printhead compatibility, since particle size control is critical. To address the limited light fastness often associated with bio-based pigments, the project used pigments with the same molecular structures as conventional pigments but sourced from renewable sources.

## End-of-life barriers and what consumers could notice

Closing the material loop still runs into practical obstacles. Waste2BioComp highlighted five issues: first, highly used composite structures that are hard to separate; second, limited dedicated collection streams for emerging materials; third, weak consumer guidance on disposal routes; fourth, additives that hinder recyclate purity; and fifth, a high diversity of bio-based polymers requiring specific recycling pathways.

If Waste2BioComp materials reached the market, consumers could notice changes beyond lower fossil input. As Helena Vilaça concludes, "Beyond environmental advantages, consumers would experience several practical benefits if Waste2BioComp products reached the market. These include safer, less toxic materials, since PHA-based plastics, whether rigid or flexible, do not require harmful plasticisers, and improved skin compatibility, as confirmed by non-sensitisation results for PHA insoles and printed textiles."



*W2BC PHA-based plastics, whether rigid or flexible, do not require harmful plasticisers.*

---

### PROJECT

**Waste2BioComp – Converting organic waste into sustainable bio-based components**

---

### COORDINATED BY

Technological Centre for the Textile and Clothing Industry of Portugal in Portugal

---

### FUNDED UNDER

Horizon Europe – Digital, Industry and Space

---

### CORDIS FACTSHEET

[cordis.europa.eu/project/id/101058654](https://cordis.europa.eu/project/id/101058654)

---

### PROJECT WEBSITE

[waste2biocomp.eu/](https://waste2biocomp.eu/)



# CORDIS Results Pack

Available online in six language versions: [cordis.europa.eu/article/id/463228](https://cordis.europa.eu/article/id/463228)



## Published

on behalf of the European Commission by CORDIS at the  
Publications Office of the European Union  
L-2985 Luxembourg  
LUXEMBOURG

[cordis@publications.europa.eu](mailto:cordis@publications.europa.eu)

## Disclaimer

Online project information and links published in the current issue of the CORDIS Results Pack are correct when the publication goes to press. The Publications Office cannot be held responsible for information which is out of date or websites that are no longer live. Neither the Publications Office nor any person acting on its behalf is responsible for the use that may be made of the information contained in this publication or for any errors that may remain in the texts, despite the care taken in preparing them.

The technologies presented in this publication may be covered by intellectual property rights.

**This Results Pack is a collaboration between CORDIS and the European Health and Digital Executive Agency.**

|       |                        |                |                     |                   |
|-------|------------------------|----------------|---------------------|-------------------|
| Print | ISBN 978-92-78-45083-0 | ISSN 2599-8285 | doi:10.2830/2044719 | OA-01-25-174-EN-C |
| PDF   | ISBN 978-92-78-45082-3 | ISSN 2599-8293 | doi:10.2830/9205304 | OA-01-25-174-EN-N |

Luxembourg: Publications Office of the European Union, 2026

© European Union, 2026



The Commission's reuse policy is implemented under Commission Decision 2011/833/EU of 12 December 2011 on the reuse of Commission documents (OJ L 330, 14.12.2011, p. 39, ELI: <http://data.europa.eu/eli/dec/2011/833/oj>).

Unless otherwise noted, the reuse of this document is authorised under the Creative Commons Attribution 4.0 International (CC BY 4.0) licence (<https://creativecommons.org/licenses/by/4.0/>). This means that reuse is allowed, provided appropriate credit is given and any changes are indicated.

Cover photo: © innni/stock.adobe.com

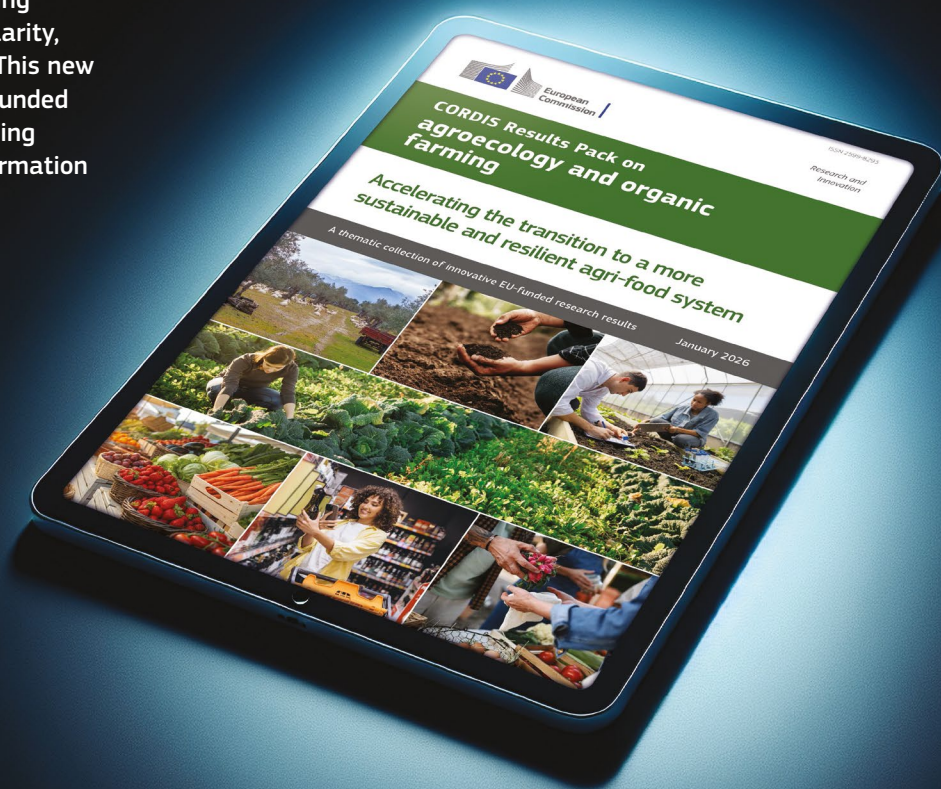
For any use or reproduction of elements that are not owned by the European Union, permission may need to be sought directly from the respective rightholders.

Follow us on social media too!

-  [facebook.com/EUScienceInnov](https://facebook.com/EUScienceInnov)
-  [x.com/CORDIS\\_EU](https://x.com/CORDIS_EU)
-  [youtube.com/CORDISdotEU](https://youtube.com/CORDISdotEU)
-  [instagram.com/eu\\_science](https://instagram.com/eu_science)
-  [linkedin.com/EU-science-research-and-innovation](https://linkedin.com/EU-science-research-and-innovation)

## RESULTS PACK ON AGROECOLOGY AND ORGANIC FARMING

By working more with nature and ecosystem services, agroecology and organic farming have the potential to increase the circularity, diversification and resilience of farms. This new CORDIS Results Pack highlights 12 EU-funded research and innovation activities focusing on how agroecology can drive a transformation of European farming.



Check out the Pack here:  
[cordis.europa.eu/article/id/462116](https://cordis.europa.eu/article/id/462116)