

**Project title:**

"Implementation of a new **Circular Economy** through the valorization of postconsumer **PLA**stic waste and reclaimed pulp **FIB**er"

Acronym: **LIFE CEPLAFIB**

Grant number: **LIFE17 ENV/SI/000119**

Project participants

Coordinator: Razvojni Center Orodjarstva Slovenije/Slovenian Tool and Die Development Centre - TECOS (Slovenia)

Partners:

1. Adria Mobil, Proizvodnja, trgovina in storitve d.o.o. - ADRIA (Slovenia)
2. Fundación AITIIP - AITIIP (Spain)
3. Ecopulp Finland oy - ECOPULP (Finland)
4. Instytut Techniki Budowlanej/Building Research Institute - ITB (Poland)
5. OMAPLAST reciklaža plastike d.o.o. - OMAPLAST - (Slovenia)

Implementation period: July 2, 2018 - December 31, 2021

Total Project value: EUR 1,832,020

The overall planned budget of the Project for the Building Research Institute: EUR 242,141 (including the maximum European Union funding of EUR 145,284).

The goal of the LIFE CEPLAFIB Project is to implement the polymer waste valorization technology for the production of composite materials reinforced with cellulose fibers, showing competitive properties with conventional materials available on the market. The project implementation methodology was developed taking into account the technical and economic aspects of the circular economy. Activities planned under the project are of a pilot nature, and their result will be the development of a new technological and economic approach aimed at improving the quality of products made of recycle, while maintaining the principles of sustainable development. The developed materials will be verified in terms of their applicability in the automotive and packaging industries as well as in construction. The results of the LIFE CEPLAFIB project are to increase public awareness of the circular economy and demonstrate that it is possible to increase the recycling rate by 40% and reduce greenhouse gas emissions accompanying the currently used analogous recycling techniques by nearly 40%.

The following activities have been planned as part of the Project:

- Preparatory activities (A):
 - Protocols on project implementation and monitoring (A1),
- Implementation activities (B):
 - Manufacturing of materials reinforced with recycled fibers (B1),
 - Implementation of the project results in the packaging industry (B2),

- Implementation of the project results in the automotive industry (B3),
- Implementation of the project results in construction (B4),
- Monitoring the impact of project activities (C):
 - Monitoring the impact of the project (C1),
 - Conclusions and recommendations (C2),
- Building public awareness and disseminating the results (D):
 - Communication strategy (D1),
 - Dissemination of project results and stakeholder engagement (D2),
 - Project management (E1).

Project results: The intangible result of the project will be an increase in the awareness of the public, especially representatives of the automotive, packaging and construction sectors, in the field of rational waste management, the use of secondary raw materials and their processing potential, sustainable production and the benefits of implementing a business strategy based on the assumptions of the circular economy closed. In the long term, this is to be directly reflected in the constantly reduced number of landfills, thus minimizing the negative human impact on the environment and improving the quality of life of the society.

Two commercially available grades of recycled polypropylene and polyethylene composites reinforced with different contents of newsprint fibers were developed, the first material composition for injection molding applications and the second for thermoforming applications.

CEPLAFIB composites were then used to produce new utility products, such as hot-pressed protective packaging, injection-molded and thermoformed recreational vehicle fittings, decorative facade panels and acoustic screens for construction.

In the first stage of the research, many preliminary formulas of composites were tested, changing the content of fibers, coupling agents and impact modifiers as well as their interfacial proportions. After many optimization iterations, we have managed to create two optimal material recipes adapted to injection molding and thermoforming technologies, which confirm up to 195% higher modulus of elasticity and 40% higher strength compared to a conventional recycled polyolefin matrix. In addition to exceptional mechanical properties, our CEPLAFIB materials have a tremendous economic advantage as they are approximately 25-35% cheaper than standard PP / PE primary polymers and achieve approximately 40-50% lower prices than competing WPC composites on the market today.

These materials were used to develop and validate new products for three sectors: automotive, packaging and construction, in accordance with the applicable industry regulations and quality standards.

CEPLAFIB project proposes the implementation of a circular economy as a cross-cutting solution to the problem of environmental pollution with plastic and paper waste. The sustainability that manifests itself in the new CEPLAFIB composites and products, developed from post-consumer plastic waste and newsprint, is closing material loops by ensuring that raw materials remain in production for as long as possible. At the same time, by transforming waste into new, high-quality primary materials as part of a new value chain, it increases the market opportunity for OEMs and aftermarket suppliers to meet their sustainability goals.

CEPLAFIB team is delighted to share with the world its **very final video**, in which you can discover all the developments achieved within the project. CEPLAFIB finally successfully produced a new high-quality composite material, 100% recycled, made from post-consumer

wastes such as deinked newspaper fibers, recycled polypropylene and high/low density polyethylene. A material with the potential to be used for mass production in multiple sectors to manufacture a new generation of sustainable products. <https://youtu.be/WSGy9CI-IGY>

CEPLAFIB has focused on 3 sectors: automotive-caravanning, industrial-packaging, and construction, and has managed to develop several demonstrators.

- Product 1: Distance holder. A special construction element with an exceptional structural strength for lifting the double floor decking in ADRIA's Mobil motorhomes.
- Product 2: A thermoformed panel to protect the ventilated slots from the ingress of dust or dirt on the bottom body floor of Adria's motorhome.
- Product 3: Protective inserts for PVC pipes for preventing their contamination during the transport and industrial trays for enveloping the sensitive instruments.
- Product 4: Shiny and colourful façade elements to decorate sustainable interiors and exteriors.

But, CEPLAFIB's innovation has gone further and has replicated and transferred its recycling materials and methodology to other sectors, achieving several different examples of branded products: recycled plastic multi-colour hornshoes, stress-free storage boxes or even didactic building block toys which were once yogurt jars!

After years of research, the European LIFE CEPLAFIB project has managed to implement a revolutionary approach to raise the European recycling rates for post-consumer plastic and newsprint paper waste, promoting a new circular economy that will become a sustainable alternative to climate change. CEPLAFIB proposes to move industrial practices towards a greener production model based on low consumption and reuse of existing resources, and offering itself as a solution to the negative environmentally impact of plastic.

Layman's report: <https://ceplafib.eu/wp-content/uploads/2021/09/CEPLAFIB-LAYMANS-REPORT.pdf>

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