



**DELIVERABLE D.T2.2.2 REPORT BASED ON THE OUTCOMES OF THE BUSINESS SUPPORT SERVICE (PULP AND PAPER RESEARCH INSTITUTE)**

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## 1. TRENDS IN EUROPE

### 1.1. CELLULOSIC PACKAGING

The Confederation of the European Paper Industry (CEPI) is a Europe-wide association that collects 495 companies through its 18 national associations. Together, these companies operate more than 900 cellulose plants and papercrafts throughout Europe and produce paper, paperboard, pulp and other biological products. CEPI accounts for 22% of world production, 82 billion EURO annual turnover for the European economy and employs more than 177 000 people directly. It currently invests 5.5 billion per year and is a leader in low-carbon circulating bioeconomy. The differences in the trend in the production of graphic papers types compared to packaging types continue to decrease in the production of graphic types and continued growth of packaging types.

### 1.2. PAPER PACKAGING MARKET

The estimation of the production growth of packaging paper is 3.7%. In the framework of packaging species, mainly packaging used in the transport and corrugated boxes, a strong increase in production was recorded, by 5%. The production of folding cardboard together with other packaging species, such as packaging for small goods or for book tops, has increased by 0.5%. Production is influenced by current trends, using low-weight packaging, which affects the performances measured in tones. The proportion of packaging species is 51.2% (50.2% in 2016) to total paper, cardboard and cardboard production, while the share of the production of graphic types is 36,2%.

### 1.3. NEW POTENTIAL MARKETS FOR INNOVATIVE PRODUCTS

The planned increase in the production of the packaging paper must take into account that the competitiveness of this commodity will only be possible on the basis of research into innovative technologies for the production of paper, biopolymer and combined recyclable, biologically degradable and compostable packaging materials. This will achieve a higher assessment of the wood raw material and the high added value of environmentally friendly packaging materials and packaging.

### 1.4. REGULATORY ENVIRONMENT

Sustainability issues are having a profound effect on regulatory activity within the packaging industry at present, driven by the growing desire for a truly circular economy. Europe and the EU appear to be at the forefront of much of the regulatory activity currently taking place as far as sustainability is concerned, via legislation such as the Packaging Waste Directive and the new law banning single-use plastic items such as plates, cutlery, straws and cotton buds stick by 2021.

An important driving force would be the propagation and impact of the EPR system at EU level. Extended Producer Responsibility (EPR) involves the extension of a producers' financial and/or physical responsibility for its product to the post-consumer stage of the product's life cycle.

## 2. COUNTRY SPECIFIC DATA – SLOVAKIA

### 2.1. MARKET IN SLOVAKIA

Slovakia is not behind, and Mondi SCP in Ružomberok began with the construction of a new machine on cardboard paper with a white surface, which is part of the ECO plus investment project worth 340 million. The project also includes the modernization and expansion of cellulosic. The project is yet the biggest investment of this business, by creating a few hundred new jobs. Cardboard paper with a white surface combines the strength, the possibility of printing and the appearance benefits of white surface paper from cellulose with the economic advantages of the recycled bottom layer of paper. At the same time, processing of more than 200.000 tones of recycled paper is awaiting. Cardboard paper with a white finish focuses on the growing markets of white-coated packaging. The cellulose-paper and packaging industry in Slovakia generally responds to increased demand for biodegradable compostable packaging and continues the trend of increasing paper production by constructing two new production units for the production of packaging materials not only in Company Mondi SCP A.S., Ružomberok, but also in Bukóza Holding a.s., Hencovce.

## 2.2. MULTIMATERIAL PAPER/BIODEGRADABLE PLASTICS PRODUCTS

Packaging materials production technologies are geared towards products with added high value, higher use of secondary fibers from the waste paper, and substitution of synthetic polymers by biopolymers and biodegradable plastics. Packaging materials will be resistant to water, oil, fat, water vapor, oxygen, volatile aromatic substances, hinder the migration of mineral oils into packaged foods and meet the surface quality requirements required for printed electronics on RFID-the radio frequency identification of the goods and its quality in paper, biopolymer and combined intelligent packaging.

## 2.3. BIOPLASTICS AND BIOCOSCOMPOSITES IN COMPANY R&D

The Pulp and Paper Research Institute in R&D is focused on innovations of processes in production technologies, ensuring production efficiency, reducing production costs, increasing added product value, increasing the competitiveness of SR enterprises, identifying and eliminating bottlenecks in production technologies, increasing the market share of our companies, and mainly to reduce the negative environmental impacts of production. Other outputs are oriented to upgraded products and entire product lines in the field of new products based on barrier composite packaging materials and products with barriers created on paper support with lower production costs, lower weight, and compostable, as compared to the current products.

Further orientation is on innovative technologies for the production of paper-based intelligent packaging materials in combination with biopolymer and products of printed electronics with lower production costs, i.e. lower price, lower weight, easy recyclable and biodegradable compared to the current state. The above advantages will extend the application of printed electronics in practice not only in the field of classical electronics, but also in the field of intelligent packaging, with the possibility of optimizing storage, logistics, business activities, the use of products packaged in these packages and recycling. Downstream outputs will be new coating compositions, new modified processes of application of paint compositions and paper refining, new composite materials paper-biopolymer, new touchless printing techniques for dye application with incorporate guiding nanoparticles, semiconductor and dielectric organic substances.

## 3. ECONOMIC FEASIBILITY STUDY ON SOLUTION

Solutions will benefit from the innovative technology of the production of qualitatively new biodegradable, environmentally friendly and easily recyclable packaging materials based on paper, biodegradable polymers and their combinations. New technologies, that expand the range of products for packaging, will have a good performance and to be competitive on the domestic and foreign market. The current theoretical and practical

knowledge of the modification of the structure of the paper surface gives real assumptions for achieving the objectives of the surface-refining technology.

### 3.1. TOTAL COST OF NEW PACKAGING MATERIAL

The use of recyclable and biodegradable supporting paper with a surface of processed paper with bioplastics instead of undegradable synthetic polymers will prevent the negative impact of barrier and intelligent packaging on the environment. Because the price of the paper support is about six times lower compared to the price of the film from synthetic polymers and biopolymers, there is a large space for coating the paper by water dispersions of biopolymers and the creation of multi-layer combined materials by coating, laminating or extrusion of paper while maintaining its competitive advantage.

### 3.2. BENEFITS

The research strategy for a long-term strategic research project in Slovakia "High-value wood-based technologies" is coordinated by Pulp and Paper Research Institute. For the activities of this strategy in biologically degradable packaging based on lignocellulosic and bioplastic materials the Institute offers own technologies. Outputs of the activities will be focused on the research of special biologically degradable paper-based packaging and biodegradable plastics with special barrier properties permitting replacement of plastic packaging, on semi-operating devices under "open Laboratory ", which cannot provide production-oriented combinations with its strong infrastructure. Publication and patent activity are foreseen. The contribution of the solution consists in increasing the degree of finalization in the processing of less valuable packaging materials, achieving higher added value in line with the current trends in disposal and recyclability of packaging are the expected result.

The main benefit of the solution is the replacement of plastic packaging, dangerously accumulated in nature and in the world's oceans, by biologically degradable and compostable packaging based on paper, cardboard and biodegradable plastics. Both patent protection and the implementation of technological transfer are foreseen. New jobs will be set up within the activity.