

**DanuBioValNet Roadmapping Workshop –  
Bio-based Packaging  
Ljubljana, Slovenia  
24. May 2018**

## 1. Introduction

---

Bio-based packaging materials can be defined like „materials derived from renewable sources“. In addition such materials recognised as biodegradable according to the standards outlined in related EU Standards can be also understood a bio-based materials<sup>1</sup>.

By the 1970s petroleum-based materials, had to a large extent, replaced those materials derived from natural resources. But this trend is about to change again since recent developments are raising the prospects that natural based resources will be a major contributor to the production of industrial products. Significant steps forward have been made over the recent past in terms of new products, material and processes that will bring down costs and optimize performance of bio-based packaging materials. At the same time environmental concerns are high on the policy agenda of industrial countries and public debates are intensifying the interest in agricultural and forestry resources as alternative feedstocks. However, the biggest challenge remains the development of new markets and costs and performance competitive bio-based packaging materials. A high potential market for such materials is the food packaging, a highly comparative areas with increasing demands from the market side.

There are many national and multinational initiatives that further fuel the demand for new bio-based packaging material. Among others, compostability, which is a very appealing property when the packaging meets its end of useful like, is a key functional behaviour to successfully reach the goal of Circular Economy.

**Paper and board-based packaging** is very popular, particularly among consumers. This is one reason why paper and board are among the most widely used packaging materials in the world, including in Europe. Paper and board are bio-based (in Europe from sustainably managed woods, with PEFC or FSC mark), recyclable, biodegradable and suitable for thermal recycling (incineration). Apart from its application in paper and board, **wood** is mainly used for transportation in the form of pallets and crates. The big advantage of wooden pallets is that they are sturdy, easy to repair and have a long life.

Renewables can be used to make bio-based plastics that are identical to petrochemical plastics. Well-known examples are **bio-PE** and **bio-PET**. These bio-based plastics are also referred to as ‘drop-in’ plastics. The advantage of both bio-PE and bio-PET is that these materials can be processed via the conventional recycling routes. The strong surge in the use of bio-based packaging is largely attributable to bio-PE and bio-PET. Other more recent bio-based plastics are **PLA (polylactic acid)**, **starch** blends and **PHAs (Polyhydroxalkanoates)**. Besides being a chief component of paper, **cellulose** is also used to make products such as cellophane (film), viscose (fibres) and cellulose derivatives such as cellulose acetate. Cellophane is widely used as a packaging material for e.g. confectionery and floral bouquets.

---

<sup>1</sup> Claus J. Weber (eds), 2000, Biobased Packaging Materials, The Royal Veterinary and Agricultural University, ISBN 87-90504-07-0

## 2. Background

### 1.1. Interreg DanuBioValNet

The DanuBioValNet project, launched in 2017 through a cross-regional partnership involving 17 partners from 10 Danube regions, will enhance transformation from fossil-based economy towards an economy using renewable resources by creating Danube bio-based value-added networks. The project will connect Danube actors in a bio-based industry to minimise greenhouse gases and to optimise biomass resource utilisation. These effects will improve the sustainability, regional development through diversification of the local economy and will positively affect the workforce. The emerging transnational cooperation of clusters is put in the focus to foster bio-economy and eco-innovations and lead to a strengthening of the regional economies.

Partners agreed that phytopharma, eco-construction and bio-plastic/advanced packing (bio-based packaging) are high potential value chains that allow partners to connect SMEs, farmers, universities, and research institutes within a value-added DanuBioValNet network. The partners intend to develop and implement a long-term, industry-driven roadmap for such collaboration along the entire value chain based on cluster partnerships for these processes. Focusing on the selected high potential, and harnessing the nature of regional clusters within wider cross-regional selected value chains, DanuBioValNet will implement pilot actions, involving SMEs, universities, research institutions, policymakers, and civil society among others. The pilot actions serve as the prerequisite for creating a blueprint for cross-regional cooperation.

### 1.2. Interreg BIOCOMPACT-CE

The main objective of project BIOCOMPACT-CET, which launched in 2017 and involves 10 partners from 6 European countries, is to provide to stronger linkages between R&D institutions and companies in the area of paper-plastics packaging solutions with the aim to introduce verified biodegradable materials in paper and cardboard packaging. Paper and cardboard represented 41% of packaging waste generated by weight in the EU-28 in 2013 (about 32.2 million tonnes). The appearance of microplastics in recycled paper secondary materials and compost is becoming a major concern. There is a high potential for mobilizing synergies between business and research in the area of combined paper-bioplastics packaging design, production and recycling in Central Europe. Linkages are not sufficiently established due to lack of awareness among paper packaging producers on new bioplastics materials, a separated focus on plastics and paper in clusters and branch organizations, the lack of a common innovation strategy within a clear European and national legal and economic context and the lack of dedicated tools to support SME's in introducing new paper-plastics packaging solutions. The project foresees an innovative cross-sectoral approach and the involvement of clusters, branch organizations and stakeholders that will allow to focus on regional economic specializations and to speed up technology transfer.

### 3. Defining the bio-based packaging sector

Within the Danube Region more than 450,000 employees have been working in the Bio-based Packaging industry in 2014, this equals a share of approximately 27 % of all related jobs in Europe. The share of respective firms in the Danube Region, compared to Europe as a whole, ranges at the same level (28 %). Thus, the Danube Region is well-positioned in terms of Bio-based Packaging, however, it does not play an outstanding role like it does in the Bio-based packaging industry<sup>8</sup>. Nevertheless, above-average growth rates of nearly 10 % since 2008 regarding the number of operating firms in the bio-based packaging sector indicate an increasing importance. Contrary to these developments, employment in the Danube Region is regressive (-4,6 %) and, moreover, average wages display lower growth rates in the Danube Region than in Europe.



Figure 1: Value Chain for bio-based packaging sector (source: DanuBioValNet)

The operationalisation of the bio-based packaging sector was developed within the DanuBioValNet project by an active involvement of the partners and cluster managers. This became necessary since the composition of this sector was unknown before. In a first step, the characteristic Value Chain for the bio-based packaging sector was jointly developed with the partners (Figure 1). The first node can be “cultivation” in case the raw materials can be cultivated. Or, the node can be defined by “collected”, in case the raw material has to be collected in the wild. However, all the following nodes of the Value Chain remain the same.

In a next step, all partners and related cluster managers did a detailed mapping of their bio-based packaging cluster initiatives and clusters in their region according to the pre-defined value chain<sup>2</sup>. For this purpose the members of the identified cluster initiatives and clusters were grouped by project partners and cluster managers according to the specific nodes of the bio-based packaging value chain they operate in.

In those cases, where no cluster initiatives existed, key cluster actors were identified and grouped. In a third step, the specific NACE industry classifications<sup>3</sup> for all members or cluster actors were identified as part of the cluster mapping exercises, that allowed to produce a reliable picture of the bio-based packaging industry.

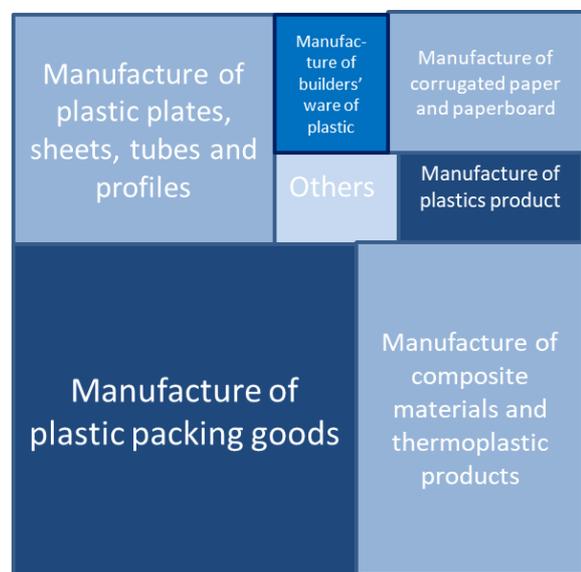


Figure 2: Bio-based packaging industry composition based on NACE industry classification 2008 (source: DanuBioValNet)

<sup>2</sup> Further details of the individual cluster mapping exercises are given in the regional cluster mapping fact sheets available on the DanuBioValNet website ([interreg-danube.eu/danubiovalnet](http://interreg-danube.eu/danubiovalnet))

<sup>3</sup> According to NACE Rev. 2 2008; Eurostat – Methodologies and Working Papers (2008), ISSN 1977-0375

The bio-based packaging industry composition illustrated in Figure 2 is based on the intensive work of the project partners and related cluster managers and is based on more than 300 companies and their related NACE classifications identified. The size of the different boxes (NACE classifications) is proportional to number of enterprises. As Figure 2 illustrates the biggest share of enterprises (about 40 %) operate in the sector “Manufacture of plastic packaging goods” (NACE Code C22.22). 8 % of the enterprises deal with “Manufacture of corrugated paper and paperboard” (NACE Code 17.21).

#### 4. Gaps, missing links and policy-related obstacles

The objective of the Bio-based Packaging Roadmapping Workshop is to gain insight into trends that will impact products and markets as well as opportunities and challenges for clusters active in the industry. The workshop discussions will help to inform policy on how to improve conditions that currently hamper competitiveness and exploitation of opportunities along the bio-based packaging value chains in the region.

