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OSIA for closing bio-based value chains

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Kristina Eder and Daniel Rogl (Business Upper Austria)
Gregor Švajger (Ministry of Education, Science and Sport)
Darja Osvald (Anteja ECG d.o.o.)

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Disclaimer

For further information about the DanuBioValNet project, you will find a short description in this document. To learn more and to download additional resources please refer to the project website http://www.interreg-danube.eu/approved-projects/danubiovalnet. The information is provided without assuming any legal responsibility for correctness or completeness. The data presented in the report are based on the information given by the project partners.

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BBI JU	Bio-Based Industries Joint Undertaking
BSO	Business Support Organization
DTP	Danube Transnational Programme
EU	European Union
LCA	Lifetime cycle assessment
NGO	Non-governmental organisation
SME	Small and Medium-sized Enterprise
VC	Value chain

DanuBioValNet project

The DanuBioValNet project is a cross-clustering partnership for boosting eco-innovation by developing a joint bio-based value-added network for the Danube Region. DanuBioValNet stands for development of a joint bio-based industry cluster policy strategy, clusters connecting enterprises transnationally, new bio-based value chains in the Danube Region and eco-innovations for supporting regional development.

The DanuBioValNet project, launched in 2017 through a cross-regional partnership involving 17 partners from 10 Danube regions, will enhance transformation from a fossil-based economy towards an economy using renewable resources by creating bio-based value-added networks. The project will connect Danube actors in a bio-based industry to minimize greenhouse gases and to optimize biomass resource utilization. These measures are intended to improve the sustainability and regional development through diversification of the local economy while positively affecting the workforce. The focus on emerging transnational cooperation of clusters should serve to foster the bio-economy and eco-innovations and should lead to a strengthening of the regional economies.

The development of new bio-based value chains from primary production to consumer markets needs to be done by connecting enterprises from different regions and industries. However, due to a missing holistic transnational approach, the Danube actors in the current bio-based industry still operate disconnected and cannot properly benefit from their potential. Therefore, the aim of this project is to develop new methods, strategies and tools to connect enterprises transnationally. Clusters represent groups of industries that are closely linked by common products, markets, technologies and interests. They are chosen to organize and carry forward the needed industry cooperation for the creation of new value chains. Properly performing clusters can help to upgrade industrial practices, generate new knowledge and contribute to regional policy-making.

The partners of the DanuBioValNet agreed that phytopharma, eco-construction and bio-plastic/advanced packing (bio-based packaging) have a high potential for improvement of their respective value chains, and hemp is considered as a raw material suitable for all the three value chains. Project efforts are designed to 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 sectors, 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

Workshop “Biopackaging – let´s create future together”

The workshop was a cooperation event and was organized by three partners of the DanuBioValNet project. Business Upper Austria was the host of the event, whereas the Ministry of Education, Science and Sport Slovenia and Anteja ECG (Slovenia) were co-hosts. Additionally, EcoPlus, a business agency of Lower Austria, was also a co-host of the event. EcoPlus is the initiator of the Austrian Biopolymer-team, which has around 30 participants who meet regularly. The workshop “Biopackaging - let´s create future together” was connected to a meeting of the biopolymer-team. The event is part of the Pilot Actions which are carried out in the context of the project. For each value chain (bio-based packaging, eco-construction and phytopharma) at least one pilot action is organised. The goal is to create eco-innovations and project ideas that shall target identified gaps and obstacles of the value chain which will further result in the creation of the value chain. The Pilot Actions will match the needs of the SMEs with SMEs, academia or other solution providers that have the capacity to solve the problem. In last step, SMEs and problem solvers will be matched within the Pilot Action and actively supported to find solutions, innovations or project ideas.

The event took place at the Palais Lower Austria, Vienna, on the 6th of March 2019. The objective was to facilitate cross-border and cross-regional cooperation of clusters and SMEs for creation of a bio-based packaging value chain. Thus, the workshop included a session with three working groups on different topics related to bio-based packaging. Results of these discussions were formation of problem areas and proposed measures, especially in terms of raw materials, depletion of non-renewable fossil resources, use of bio-based packaging and what advantages it brings for the companies, clusters role and existing and new policy strategies in bio-based packaging field. The workshop also helped create interesting project ideas/initiatives and a macro regional network opportunities for the participants – company representatives, entrepreneurs, researchers and experts alike.

Background

Bio-based packaging materials can be defined like „materials derived from renewable sources“. In addition, such materials recognized as biodegradable according to the standards outlined in related EU Standards can be also understood a bio-based materials.[1] It is evident that there is opportunity for the development of the bio-based packaging value chain in the Danube region. According to the latest market data compiled by European Bioplastics in cooperation with the research institute nova-Institute, global bioplastics production capacity is set to increase from around 2.11 million tonnes in 2018 to approximately 2.62 million tonnes in 2023.[2]

The packaging sector is the largest application sector for plastics in general (almost 65% of total bioplastic market). Bio-based drop-in plastics can lower the environmental footprint of plastic packaging and can be fully recycled. Biodegradable and compostable plastics offer additional end-of-life options for certain applications. Italy and France favour the use of biodegradable and compostable plastics through legislation while other countries do not see this as an option. So far, there is no common understanding, agreement or strategy in Europe on the question of which bio-based and/or biodegradable plastics can and should play a role in sustainable packaging and the circular economy. The understanding and political framework differ from one member state to the other. The correlation between framework conditions and market success of bio-based packaging is very high and strongly affects future projections. Biodegradable plastic markets have become political markets to a large extent.

Participants

The workshop attracted participants of different target groups from six countries, which reflects the relevance of the topic on ministerial, business cluster, academic and research level.

Country	Project target group				Other	Total per country
	Regional public authority	BSO	SMEs	Higher education & research	NGO	
Austria		4	12	6	1	**23**
Belgium				1		**1**
Bulgaria		5				**5**
Czech Rep.		1	6	1		**8**
Germany		1	3			**4**
Slovenia	1	1	2	3		**7**
Total per group	**1**	**12**	**23**	**11**	**1**	**48**

Table 1: Participants of the workshop "Bio-packaging - let´s create future together"

Agenda

The workshop started with greeting from the hosts and co-hosts: Heidrun Hochreiter (Business Upper Austria), Florian Kamleitner (EcoPlus), Darja Osvald (Anteja ECG) and Gregor Švajger (Ministry of Education, Science and Sport Slovenia). Two keynote speakers provided initial input for the event.

[1] Claus J. Weber (eds), 2000, Bio-based Packaging Materials, The Royal Veterinary and Agricultural University, ISBN 87-90504-07-0

[2] https://www.european-bioplastics.org/wp-content/uploads/2016/02/Report_Bioplastics-Market-Data_2018.pdf

Polyvios Hadjiyiangou from BBI JU presented a high impact initiative structuring the EU bio-based industries, followed by Andrej Kržan from the National Chemical Institute Slovenia with presentation on better production solutions for better adaptation. Andrej Kržan also moderated the subsequent plenary discussion on the issue of bio-packaging. Active participation already showed that the topic is very relevant throughout Europe and has a high significance for interested stakeholders.

A lively discussion among the participants took place, mainly about the problem areas of bio-plastics and related bio-packaging, which are described below:

- Delimitation between plastics and bioplastics
- Poor marketing of bioplastics and products
- Biodegradability of biopolymers
- Is biodegradability a problem of agriculture
- How to solve the problems of micro-plastics
- Lack of recycling systems for bioplastics
- Mechanical problems with bioplastics, temperature resistance, and similar
- Biodegradability of bio-plastics in nature and in human body

	non-biodegradable	biodegradable
biobased	BIOPLASTIC	BIOPLASTIC
fossil-based	plastic	BIOPLASTIC

Figure 1: The difference between biodegradable plastics and bioplastics

Figure 2: Darja Osvald, Anteja ECG, presented the potentials, obstacles and gaps in the bio-based packaging value chain as results of the implemented project activities (cluster mapping, value chain mapping and roadmapping)

Field/VC	Bio-based sources / feedstock	Technology and application (R&D)	Market development	Socio-economic factors (legal, economic, social conditions, HR etc.)	Policy / business environment / legislation
Bio-based Packaging	- Lack of support for agriculture to produce the crops suitable for production of biopolymers	- Lack of adequate machinery/technical solutions suitable for processing used raw materials	- Lack of triggers for market demand for bio-based packaging products	- missing composting system of bioplastics, education of the population	- Lack of cross-sectional/sectorial strategies
	- Lack of constant supply of source material	- Problematic technical properties of the biodegradable bioplastics	- Greater involvement of brands (brand messages) and retailers for using the bio-based packaging	- Insufficient knowledge about biobased potentials - Lack of information, explanation and awareness	- Need for a joint bio-based strategy that also involves bioplastics and bio-based packaging
	- Lack of continues supply chain of raw materials for the region	- Lack of manufacturers of adequate machinery for suppliers of raw materials	- Lack of cross-regional connections and networks - economy of scale	- The issue of the exploitation of agricultural products for non-food processes	- Better recycling strategies
	- Missing suppliers of raw materials	- Technical problems with manufacturing	- Missing market and demands of the bioplastic packaging	- Lack of training and education in relation to the biodegradable materials	- Need for positive legislation
		- Need for specialized tools to be developed for streamlined research projects	- Weak price / performance ratio	- Lack of better "End-of-Life" infrastructure	- Lack of data inputs and outputs for basic LCA (lifetime cycle assessment) for different bio-based packaging products
			- Very small and limited market of the bioplastic products for the final products	- Lack of knowledge and SME knowledge exchange	
			- inadequate / lack of market demand	- need for involvement of NGOs and consumer organisations	

Figure 3: Roadmap Bio-based Advance Packaging Value Chain – findings and gaps[3]

In the afternoon the participants worked on different topics in three groups. The aim was to identify and record problems in the field of bioplastics, to work out possible solutions, to exchange ideas and, if possible, to initiate cooperation. The topics to discuss were as following:

1. Bioplastics are only plastics - marketing of bioplastics and how to use the functionalities of bioplastics efficiently
2. Bio-packaging and circularity - real end of life scenarios that matter
3. Bio-packaging - a European perspective of resource independence

[3] DanuBioValNet – Roadmap Report Bio-based Advanced Packaging Value Chain, 2018; http://www.interreg-danube.eu/approved-projects/danubiovalnet/outputs

Group work

Group 1: Bioplastics are only plastics - marketing of bioplastics and how to use the functionalities of bioplastics efficiently
Moderator: Johann Zimmermann (NAKU)

Subtopic	Problem	Comments and proposed measures
Biodegradability	General problem of biodegradability	• Participants stressed the question of priorities: should we first solve the agricultural problem or the problem with micro-plastics?
Biopolymers and health	Substance should be degradable in nature and in the human body	• Participants gave a very interesting input – in terms of looking at Bioassay*) testing, they are all positive. This means that we have the proof that there are no active substances in the human body and it is a tendency that biopolymers are healthier
Sustainability	Companies do not disclose information	• Some biopolymers are "greener" than others, and it is a problem that a lot of companies are very secretive with their materials and products, therefore the transparency is lacking. • This is a challenge for companies, especially if they want to be "greener" than their competition
Mechanical and application properties	Bioplastic limitations	• Bioplastics have more limits than plastics, therefore there is a restriction for the production of bioplastics. One example for this problem was hot filling of biopolymers. Many different foods and beverages need to be hot filled in their packaging for longer shelf life. Some biopolymers have a low temperature stability. The group mentioned that it is important to have more research in this field.

Table 2: Findings on "Bioplastics are only plastics - marketing of bioplastics and how to use the functionalities of bioplastics efficiently"

Group 2: Biopackaging and circularity - real end of life scenarios that matter
Moderator: Silvia Gloser (Brantner)

Subtopic	Problem	Comments and proposed measures
Communication	Industry, legislation and universities are the key players who should communicate regularly about the topic of bio-based packaging	• There is one big common goal to achieve transformation from a fossil-based economy towards an economy using renewable resources in the Danube Region, but the key players have many different ideas to reach the goal, mainly because of lack of communication
Raw materials	Adequate quantity of resources and purpose prioritization	• Group discussed, if there are enough raw materials for the production of bioplastics. Waste was considered as a possible raw material. Lack of communication can also be noticed here; if one company has the waste and another company needs raw material, they need to talk to each other to cooperate together • There is also lack of proper waste that could be used for the production of recycled waste material. People have to be aware of proper ways to recycle or sort waste • Production of bioplastics from certain raw materials (like corn) would directly compete with food and nourishment of people. A possible solution is the use of hemp, because hemp does not need good soil, it can be grown anywhere and give a big amount of biomass. The whole plant can be used for different products
Circularity	Uptake of current technologies	• It is important to know which possibilities there are for recycling and which technologies are available. The idea is to make it clear

		for costumers, for example with a logo or special labelling.
Awareness of young people	Lack of knowledge	• The public awareness is one of the most important points, especially awareness of young people. People have to know why they should buy bioplastics and which advantages it has
Legislation	Missing legislation	• A common legislation for all Danube countries is missing so far; there needs to be a synchronization, not only on the regional level but on transnational level as well.

Table 3: Findings on "Biopackaging and circularity - real end of life scenarios that matter"

Group 3: Biopackaging - a European perspective of resource independence
Moderator: Christian Mayr (Business Upper Austria)

Participants agreed what exactly bio-based packaging is by sharing different opinions and looking at the established definitions. It can be defined as following: "bio-based packaging is renewable, from renewable resources, and does not harm the environment in any way".

Subtopic	**Problem**	**Comments and proposed measures**
Raw materials	Source of bio-based packaging	• One possible source for bio-based packaging could be organic and non-organic waste. The participants of the working group stated that in the Danube Region plant-based oil and wood are the most important sources
Energy	Energy dependence and implications	• Energy independence is more important than resource independence. Energy sources must be renewable - the availability of sustainable and cheap energy is the basic

		requirement for the resource independence. • Energy used for transport is a crucial topic; therefore, the Danube River could be used for the transportation of materials, especially wood, which would be sustainable
Willingness of people	Lack of public adaptation	• There has to be a circular economy approach, which can be the missing puzzle piece to the resource independency in Europe
Collecting and separation system	Different systems on regional and national scales	• In Europe, a lot of technical knowhow exists, but the knowledge and potential are not optimally exploited. Improvement of standardization of collecting and separation systems in Europe should be one of the priorities

Table 4: Findings on "Biopackaging - a European perspective of resource independence"

After two hours of the intensive group work, the moderators presented the results on the plenary. Thus, all participants of the event had an opportunity to ask questions or make comments. At the end of the workshop, Business Upper Austria gave a short summary of the day and the lead partner of the DanuBioValNet project, BIOPRO Baden-Württemberg, made a closing statement.

Conclusions and proposed measures

- ✓ Advanced recycling strategies should be set. Improvement of standardization of the collecting and separation systems in Europe should be one of the priorities.
- ✓ Defining raw materials for bio-based packaging. Possible sources could be organic and non-organic waste, plant-based oil and wood waste, which are the most important ones.
- ✓ Developing measures to better inform consumers by involvement of NGOs and consumer organisations. The public awareness is one of the most important points, especially awareness of young people. People must know why they should buy bioplastics and which advantages it has. Information, explanation and awareness on bio-based products must be spread by involvement of all actors in the bio-based ecosystem.
- ✓ Synchronization of legislation in terms of sustainability and environmental impacts. Legal regulations on EU, Danube region and national level (positive regulation, incentives), clear distinction of compostable plastics from biodegradable plastics.
- ✓ Adequate quantity of resources and purpose prioritization for bio-based raw material.
- ✓ Specialized tools need to be developed for streamlined research projects in the field of bio-based packaging.
- ✓ In order to meet the demand on the development of new technologies and services, pilot installations should be developed. This can result in high quality products and services from bio-based materials.
- ✓ The intermediary players are generally micro, small- and medium-size companies and do not have resources to invest or alter processes in order to make prototypes, which could demonstrate the potential of new bio-based materials. It is important to link this to R&D institutions and to proposals for pilots and demonstration projects.

Summary

If raw materials could be supplied locally in the future, the Danube region could achieve resource independence from the main producers of fossil fuels, e.g. Russia, the US, Saudi Arabia or Iraq. Thus, the added value remains in the Danube region, which in further consequence leads to an increased gross regional product, job creation and social prosperity as the final effect.

Taking into account depleting non-renewable fossil resources, renewable raw materials offer a sustainable alternative. They have a multitude of ecological advantages: resource-saving, compostable, pollutant-free, climate-friendly, recyclable. Thus, the use of bio-based packaging can contribute to environmental protection.

The use of bio-based packaging brings advantages for companies in the areas of marketing and communication. By using bioplastics, a company is committed to sustainable development and can position itself as an innovator. Furthermore, the introduction of new products made of renewable plastics ensures a high media effectiveness and differentiates the company from its competitors. The Danube region can thus stand out from the rest of Europe and play a pioneering role in bio-based packaging.

Since clusters have large networks, a major task for them is to bring together key players in the field of bioeconomy and try to initiate projects in this field. Additionally, a cluster can make recommendations for smart specialization strategies to strengthen bioeconomy in these strategies and have an impact on establishing new successful value chains in the field of bio-based packaging.

Existing and new policy strategies should include proposals for national and Danube-wide platforms for providing and extending knowledge about current technology, processes, and information about suppliers of raw bio-based materials as well as opportunities for cross-sectoral collaboration and innovation. Sustainability and environmental impact measures should also be developed on the national and Danube region level along with the advanced recycling strategies. It is also important to assure adequate data inputs and outputs for basic LCA (lifetime cycle assessment) for different bio-based packaging products as well as to better inform consumers by involvement of NGOs and consumer organisations. Other policy inputs in this area include the provision of a market driven approach to using advanced packaging as a substitute for common non-reusable packaging by involving multinational corporations and retailers. Finally, information, explanation and awareness on bio-based products must be spread by involvement of all actors in the bio-based ecosystem.