Project co-funded by European Union funds (ERDF, IPA)

Interreg

EUROPEAN UNION

Danube Transnational Programme

DanuBioValNet

Country Report

Cross-clustering partnership for boosting eco-innovation by developing a joint bio-based value-added network for the Danube Region

Framework Conditions for Cluster Development in bio-based industry in **the region of Upper Austria/Austria**

www.interreg-danube.eu/approved-projects/danubiovalnet/section/country-reports
twitter.com/danu_bioval

CONTENTS

Introduction

Description of the region

Wood

Wood is the most important renewable energy source in Upper Austria.
The majority of wood in Austria (approx. 40%) is used for energy production - approx. 17% directly and approx. 23% after material utilization.
Wood is a dominant raw material in Austria. Based on this, there is a good regional distribution for further treatment of wood, which results in relatively short transportation routes and thus ecologically favorable value-added chains. The favorable situation with regard to consumer markets, which are mainly concentrated in Central Europe, also contributes to this. In addition, well-developed value-added chains exist, which allow a cascade-like use of the different primary and secondary products.

Agriculture

The most important agricultural commodities in Austria include cereals, root crops and oil plants. The predominant part is further processed into food or animal feed, only a comparatively small proportion is utilized by energy or material use.
As a result of the decline in livestock breeding and dairy production, the potentials of grassland biomass (grass, clover, alfalfa etc.) and grassland (fallow land) increase. According to this, it is possible to use grassland biomass as a "new raw material" for a bio-based industry.

Organic waste material

The quantitative potential of residues continues to grow in Upper Austria due to the ever-improving waste separation.
Large amounts of biogenic residues (wood waste, production waste, etc.) are thermally utilized in installations approved for this purpose (for example, EEVG GmbH Laakirchen as well as RVL - GmbH, Lenzing). For material recycling for the production of plastics or special chemicals, even larger quantities than currently can be used.

Algae

In Upper Austria Fachhochschule and the Energy Institute at Johannes Keppler University Linz are concerned with questions about algae and energy production from microorganisms.
In Austria, a company has been established in Bruck an der Leitha for the industrial production of microalgae, which is specialized in the development, construction and operation of industrial breeding systems ("hanging gardens" of ecoduna). 2017 will be expanded and a new plant will be opened at the existing site, in which not only algae biomass is produced for energy production, but also high-quality vegan oil.
In order to establish a future energy supply from microalgae and to exploit the great potential of the varied types of algae, a lot of R&D work is still necessary.

Current situation in the region

Below, some recent developments as well as future trends of bio-based industries and cluster initiatives will be presented without claim to be complete.

Bio-based plastics and composites

Since more than nine years, bioplastics have become one of the main focus of the Plastics Cluster (it is part of the Business Upper Austria GmbH). The topic was continually deepened from the international research project "CORNET Biopacking", which focused on polylactic acid (PLA) packaging. The focus is on knowledge building and the transfer of know-how to small and medium-sized enterprises in Austria.
Topics
- Drop-in solutions
- Newcomer: polyethylenefuranoate (PEF)
- Natural fiber-reinforced plastics based on hemp or fennel fibers

The biopolymer team (cluster partners from industry, business and research) meets regularly to discuss current developments and trends.
The combination of natural products with plastics is expected to gain importance. Examples include natural fiber reinforced plastics based on hemp or nettle fibers as well as the combination of wood-plastic composites. “WoodKPlus” is a leading research institute in Upper Austria in the field of wood and wood-related renewable resources. The core competences are material research and process technology along the entire value chain – from raw material to finished products.

Pulp and paper

Upper Austria is – due to the forestry fortune - predestined for the production of pulp and paper which has developed to an important industrial sector. Entire regions are embossed by well-known companies, e.g. Smurfit Kappa Nettingsdorfer,

Laakirchen Papier AG, UPM Steyrermühl, Tannpapier (Traun) and Lenzing AG. Paper and cellulose fibers are already used in lots of products: wood-based cellulose fibers from Lenzing are used for the production of textiles, carpets, automotive products, furniture materials, hygiene and cosmetic products and technical textiles.

Timber construction and biogenic insulating material

Over 250 companies are partner companies of the furniture and timber construction cluster (MHC) in Upper Austria (part of the Business Upper Austria GmbH) which underlines the economic as well as ecological importance of this industry. The Furniture and Timber Construction Cluster is a cross-industry network that increases the companies' innovative potential and competitiveness. The MHC works in the furniture and timber construction sectors and is also active in these sectors' networks of suppliers and specialist providers, training institutions and research facilities.

Fine chemicals, feeding stuff and other products

The Upper Austrian Food Cluster (part of Business Upper Austria GmbH) is the largest and oldest food industry network in Austria which links all key players of the Upper Austrian food industry and creates a positive environment for innovation. The companies involved reflect the multifacetedness of the industry - from agriculture to the food production industry, trade and gastronomy, packaging manufacturers and a variety of research and educational institutions.

Energy

The main objective of the Oekoenergie-Cluster (OEC) is to support renewable energy and energy efficiency businesses in the fields of innovation and competitiveness, contributing to the positive market development in sustainable energy production and use.
The cluster partners are companies and organizations in Upper Austria which produce technologies in the areas of renewable energy use and energy efficiency, or act as suppliers on different production and service levels. The OEC also contributes to fostering Upper Austria's top position as an exemplary region in the fields of renewable energy and energy efficiency. 34 % of the region's primary energy consumption is produced from renewable energy sources.
Currently, the OEC is one of the most important energy clusters in Europe.

Cleantech Cluster

The Cluster forms a platform for environmental technology companies. Its principal mission is interlinking suppliers of environmental technology solutions and their users.

Key asset	Primary biomass sector	Food & Feed	Pulp & Paper	Chemicals	Polymers	Phyto-pharma	Textile & Clothing	Energy	Construction
Cluster organisation	X	X			X			X	X
Entreprises	X	X	X	X	X	X	X	X	X
Policy makers	X							X	X
Knowledge institutes	X	X		X	X			X	X
Biomass supply	X	X	X	X	X	X	X	X	X
Competitive bio-based industry product on the market	X	X	X		X		X	X	X
Funding	X							X	
Policies, programs and regulations								X	

Country relevant strengths and opportunities

Strengths

- Technologically and economically successful companies in many areas of bio-based industry
- Potential for technology leadership, e.g. In wood processing
- Sophisticated technologies
- Well-developed plant construction
- High potential for innovation
- Continuous increase in efficiency of the processes
- well positioned R & D area
- Scientific potential available
- Good research infrastructure
- Good cooperation between companies and universities
- High technological knowledge in the companies

It is clear that bio-based industry will continue to play an important role in Austria, both from the ecological as well as from the economic point of view, especially if it is possible to use and further develop existing know-how in terms of value chain and industry. There is great potential, especially in the field of plastics and biopolymers. Wood also offers a variety of processing possibilities and potentials, which go far beyond today's classic products.
In future, there are further utilization potentials especially in the development of microalgae technology and the material use of grassland biomass in green bio refineries, as these technologies can increase the raw material base for the bio-based industry.

Regional Bio-based industry Strategy

Currently Upper Austria doesn´t have a bio-based industry strategy nor a bio-based industry cluster. For research on numbers for the following table we have contacted the Chamber of Agriculture in Upper Austria, the Chamber of Commerce in Upper Austria, several cluster initiatives and different experts for topics around bio-based industry. Unfortunately we cannot get the "bio-based" numbers.

Criteria	Indicator	Region	
		2010	2014
Land use	Forestry land (% of total land area)	37%	41,6%
	Austria	40%	
	Agricultural & horticultural land (% of total land area)	25%	24%
	Austria	38%	
Biomass availability	Agricultural biomass production (kg/capita]		
	Blue biomass production (kg/capita)		
	Forestry biomass production (kg/capita)		
	Waste production (kg/capita)		676.935t bio-based waste 76% from households
Innovation	SME birth rage (% of total firms in region)		Start-up companies in general 6%
	R&D expenditure (index (EU = 1))		2013: R&D expenditure Upper Austria in general: 1.6 billion €
	R&D employment (% of total employment in region)		2013: 11 600 R&D employees in Upper Austria

Criteria	Indicator	Region	
		2010	2014
Cluster size	Firms in total bio-based industry sectors (% of total firms in region)		
	Employment in total bio-based industry sectors (% of total employment in region)		
	Firms in primary biomass sector (% of total firms in region)		
	Employment in primary biomass sector (% of total employment in region)		
	Firms in food & feed sector (% of total firms in region)	Food sector 1090 firms	Food sector 1134
	Employment in food & feed sector (% of total employment in region)	15 742 employees in food sector	16 263
	employees in food sector		2,0
	Firms in paper & pulp sector (% of total firms in region)		
	Employment in paper & pulp sector (% of total employment in region)		
	Firms in chemicals sector (% of total firms in region)		
	Employment in chemical sector (% of total employment in region)		
	Firms in polymers sector (% of total firms in region)	2016: Numbers for polymer cluster (not specifically bio-based):	
	cluster partner:386		
	Employment in polymers sector (% of total employment in region)	2016: employees cluster partner: 60 000	0,9
			1,2
	Firms in phytopharma sector (% of total firms in region)		
	Employment in phytopharma sector (% of total employment in region)		
Quality of workforce	Secondary & Tertiary education in bio-based industry (% of total population in region)	University of applied sciences: Graduates in Eco-Energy Engineering Bachelor: 230; master: 120, Diploma: 127 Graduates in Bio and Environmental technology: Year 2015: Bachelor: 36; master: 19 Year 2010 only bachelor: 46 Polytechnic school for food technology: Graduates 2010: 23; 2015: 23	

Source: Statistical office of Slovenia, EURSTAT, RIS, BERST project (2014)

Since 2013 the bioeconomy has been positioned as an educational and research campaign in the field of the use of biogenic resources in the work program 2013-2018 of the Austrian federal government. An inter-ministerial working group was set up to develop an action plan and a national strategy on the bioeconomy.
To set the appropriate framework for future research priorities in the field of bio-based industries and to support promising developments, in 2014 the Austrian Ministry for Transport, Innovation and Technology commissioned the Austrian Society for Environment and Technology to write an RTI (Research, Technology and Innovation) strategy.
This RTI strategy is focused on important economic sectors for Austria: the food industry, the chemical and pharmaceutical industries and the wood processing industry. To gather specific statements, interviews with industry representatives were carried out. The interviews were used to identify the strengths and opportunities of bio-based industries in Austria and to show future developments in raw material, technology and product development. Also recommendations on how to support the development of bio-based industry in Austria have been formulated. The RTI strategy shows paths of development in the provision of raw materials, product development and at the level of processing technologies.
The following recommendations to strengthen bio-based industry in Austria have been formulated:

1. Integrated industrial concepts for energetic and material use of biomass
2. Overall assessment of the environmental and economic impact of bio-based products
3. Wide positioning of the bio-based industry in Austria
4. Networking and cooperation between actors /stakeholders from government, R&D and business
5. Targeted (research) promotion for issues of bio-based industries
6. Market-related measures
7. Development in cooperation with classically grown industries

Currently the Federal Ministry for Science, Research and the Economy (BMWFW), the Federal Ministry of Transport, Innovation and Technology (BMVIT) and the Federal Ministry for Agriculture, Forestry, Environment and Water Management (BMLFUW) are working together on a national bioeconomy strategy for Research, Technology and Innovation.
On the way to an Austrian FTI bioeconomy strategy two dialog forums were organized in October and November 2016. The results were summarized in a synthesis report.
The aim of the dialog forums was to work together with the relevant stakeholders to draw up a plan of action and implementation for a bioeconomy FTI strategy. Furthermore, the results are used to derive research recommendations and suggestions for networking along the value chain. The results were merged and evaluated with regard to specific research policy recommendations.

Strategy implementation

Dissemination with regard to bio-based industry in Austria

- Stakeholder dialogue
  - Annual, public event to present the program as well as successfully funded projects.

- Bulletin “Bio-based future”
  - Information on renewable resources as well as their material and energy use.

Future challenges for cluster development in bio-based industry

- Organization (cluster organisation reinforcement, clear membership, enrich services provided to cluster participants)
- Actors (R&D providers)
- Biomass supply
- Competitive bio-based products
- Funding
- Policies and measures
- Key recommendations

It became clear that the Bio-based industry in Upper Austria will continue to play an important role in the future, especially if the entire value chain can be connected vertically and horizontally, existing know-how can be used and developed across the entire industry, thus exploiting unused synergies.
A good networking of the individual industrial sectors will be of great importance in the future as specific material properties and requirements for further processing can only be communicated through optimized supply chains and good interface management. Synergies and further developments are possible by cross-sectoral information exchange, as networking of the actors within the value chain enables the coordination of individual activities. Strategic partnerships which bring together different value chains should be strengthened in order to enable innovation leaps.
The experience to date shows, that a strengthening of the bioeconomy is strongly knowledge-based and its development depends to a large extent on research efforts.
Upper Austria has a wide range of university institutions and universities of applied sciences, which, thanks to their know-how, can make a significant contribution to the topic, in particular through interdisciplinary cooperation.
The regional raw material base is also crucial for further strengthening the Bio-based industries. It is extensive, but limited in terms of quality (wood, straw, residual material) and quantity. Therefore, cascade utilization will be particularly important in future.

The range of possible new bio economic product lines is very wide due to new technological possibilities and future-oriented processes. The question of raw material availability and the appropriate logistics has to be clarified. Further in many cases there is no economic efficiency of new procedures. From the economic point of view, the promotion of products which, due to their properties, are not in direct competition with (cheap) products from fossil energy sources is recommended.
Many new product lines require cross-industry cooperation. In addition, new services tailored to bioeconomic logistics and productions are needed. Digitization could be central productivity leverage in the bio-based process industry. This leads to new business areas in the intelligent production of bio products along the value chain and the life cycle.
There are companies or sectors which are actually part of the bioeconomy sector, but they are not (yet) self-evident. It is a problem that many companies, including SMEs, are active in the bioeconomy sector, but they are not aware of this circumstance. A change of consciousness is necessary, as well as a platform where the different members can deal with each other, where SMEs can get in touch with the research for different projects.
It also requires targeted information work and awareness-raising in order to build up social acceptance both for the topic itself and for specific products in order to strengthen their demand.
The "bio-based industry" brand has to be developed. Joint activities, exchanges and cooperation are considered to be particularly important in the future. Being a "community" allows better positioning and a stronger representation of common interests.
A goal-oriented cooperation between the various actors at industrial, agricultural and administrative level is necessary to establish future bio-based industrial paths.
It also requires initiatives and awareness raising, to communicate the future importance of the bio-based industry to the population and to bring this issue to the political agenda. Only then appropriate markets are able to develop.

Annex

Definitions/Glossary

Clusters: Clusters are generally described as groups of specialised enterprises, often SMEs, and other supporting actors in a particular location that cooperate closely together.

Cluster initiatives: A cluster initiative is an organised effort aiming at fostering the development of the cluster either by strengthening the potential of cluster actors or shaping relationships between them. They often have a character like a regional network. Cluster initiatives usually managed by a cluster organisations.

Cluster organisations: Cluster organisations are entities that support the strengthening of collaboration, networking and learning in innovation clusters and act as innovation support providers by providing or channelling specialised and customised business support services to stimulate innovation activities, especially in SMEs. They are usually the actors that facilitate strategic partnering across clusters. Cluster organisations are also called cluster managements.

Cluster participants: Cluster participants are representatives industry, academia or other intermediaries, which are commonly engaged in a cluster initiative. Given the case a cluster initiative has a certain legal form, like associations, cluster participants are often called cluster members.

Cluster policy: Cluster policy is an expression of political commitment, composed of a set of specific government policy interventions that aim to strengthen existing clusters and/or facilitate the emergence of new ones. Cluster policy is to be seen as a framework policy that opens the way for the bottom-up dynamics seen in clusters and cluster initiatives. This differs from the approach taken by traditional industrial policies which try (and most often fail) to create or back winners.

The Country Report was created by:
Business Upper Austria – OÖ Wirtschaftsagentur GmbH
A-4020 Linz, Hafenstraße 47-51
FN 89326m, Landesgericht Linz
Austria
www.biz-up.at
info@biz-up.at

www.interreg-danube.eu/approved-projects/danubiovalnet/outputs

Interreg
Danube Transnational Programme
DanuBioValNet