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Synthesis Value Chain Mapping Report Eco-Construction

WP3 D-3.3.1

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

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INTRODUCTION

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 bioplastic/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.

VALUE CHAIN MAPPING

The present Value Chain Mapping Report is the third key deliverable of the project. It is the first Value Chain Mapping Report in the Danube region. Coinciding with the period during which the block chain technology proved to change the added value creation logic and with the time that perception of strategic timeframe shrinks to one year and less.
The findings and conclusions of this report summarise the regional Value Chain Mapping Reports, with the specific focus on the missing links, main gaps, and constraints along the selected value chain and illustrate the most promising cooperation areas within this particular value chain. The report also provides observations and considerations to be taken into account of the upcoming roadmapping activity. The report follows the guidelines stipulated in the approved application form. This report also takes into account the learning and feedback received during a discussion with a partner, the kick-off conference in Prague, and the SCOM meetings.

OBJECTIVES OF THE REPORT

The report's objective is to provide an overview of the interviews conducted with representatives of the eco-construction industry in the DanuBioValNet region. The report should serve to highlight the tendencies and patterns that emerge from the aggregate information collected through the interviews. To reach the particular respondents, the contacts and networks of the clusters were used, or, when there is no cluster organisation identified, the interviews were done with the companies perceived as market leaders.
The summary statements relating to the topics listed below are based on the total number of cases interviewed. All respondents are anonymous.

METHODOLOGY

The initial value chain of eco-construction was developed among the project partners based on the research for relevant information material, among them studies, reports, global market studies, academic papers, including related policies. The lead partner provided a predefined value chains structure as base for further considerations. The regional reports on Bioeconomy (WP 3.1) identified three most promising value chains. It was supplemented with series of methodological templates on how to do the cluster mapping along selected value chains. In close collaboration with cluster managers, and regional stakeholders/project partners completed the value chain and cluster maps, including NACE codes which describe the structure of three related industries: phytopharma, bio-based packaging, and eco-construction. Partners were encouraged to conduct the quality check on information received (activity and corresponded NACE Code). The quality check was performed with back calls to the cluster managers and selected firms.
Given that the ultimate interest is to stimulate value added activities in selected regions of Danube, it is useful to understand the current and potential market considerations appropriate for each of the value chains. In the context of end markets the value chain assessment explores the critical success factors of DanuBioValNet value chains to gain insight into the related gaps and to understand the primary drivers of value chain development. For the purpose of this activity, end market analysis is defined in terms of end market producers that are selling final products to the end consumer. The face-to-face interviews were conducted to collect related information. Three task groups were established among the DanuBioValNet partners to elaborate questionnaires for the value chain mapping. The groups were formed based on the motivation of partners and regional strengths in each of the selected value

chains. Questionnaires were semi-structured by nature aims to be used for face-to-face interviews. All project partners, in cooperation with cluster managers, conducted face-to-face interviews with selected end manufacturers in the region (see more in the regional Value Chain Mapping Reports). Questionnaires were analysed and findings were used for the identification of common gaps and constraints and promising cooperation areas. Partners discussed the findings and ideas at the workshop held in Stuttgart on December 5th, 2017.

Partners finalised the activity by drafting regional Value Chain Reports. The following table provides an overview of what value chain analyses were conducted in each of the project partner regions. Some regions covered all three value chains, while other covered only two or one, depending on regional preferences.

Table 1: Overview of conducted Value Chain Analyses in each Project Partner Region (Source: Regional Value Chain Reports)

	ECO Construction	BIO Packaging	Phytopharma
Romania	X		
BW Germany			X
Upper Austria	X	X	
Czech Republic	X	X	X
Croatia	X		
Slovenia	X	X	X
Slovakia	X	X	X
Serbia	X		X
Bulgaria	X		X

Along those lines, the objective of this report is twofold. First, it summarises findings of regional reports on value chain mapping. Second, it provides vital observations to be taken into account in the roadmapping of the selected high-potential value chains.

STRUCTURE OF THE REPORT

The rest of the report is organised as follows. The next section provides an introduction to the eco-construction value chain methodology. Chapter 2 presents a summary of findings of regional reports on value chain mapping. The last chapter provides some vital observations to be taken into account in the road mapping exercise of the selected high-potential value chains.

ECO-CONSTRUCTION VALUE CHAIN

Eco-friendly construction (eco-construction) is building a structure that is beneficial or non-harmful to the environment and resource efficient. Also known as green building, this type of construction is especially efficient in its use of local and renewable materials (preferably wood-based materials). Also in terms of energy production and consumption, eco-construction focuses on obtaining the required energy from green sources. Eco-construction has developed in response to the knowledge that buildings often have a negative impact upon our environment and our natural resources. This includes transporting materials hundreds or thousands of miles, which increases the energy required for transportation and avoids the emissions of hazardous chemicals from a poorly designed building that creates and traps them.

Multiple options are now available to design and to build an eco-friendly dwelling. Architects, civil engineers and builders worldwide are now using construction techniques that have been developed throughout history, in response to local environmental concerns and the physical resource opportunities available. On top, 21st century technological refinements have been boosting construction techniques essentially. Buildings that integrate passive energy systems (bioclimatic buildings) are operated using non-mechanical methods, thereby optimising the use of natural resources. This involves the positioning and location of a building to allow and make use of sunlight throughout the whole year. By using sun rays, thermal mass is stored into the building materials such as concrete, which allows the generation of enough heat for a room. Eco-friendly building often uses eco-materials, which are certified green building materials, such as wood from sustainably

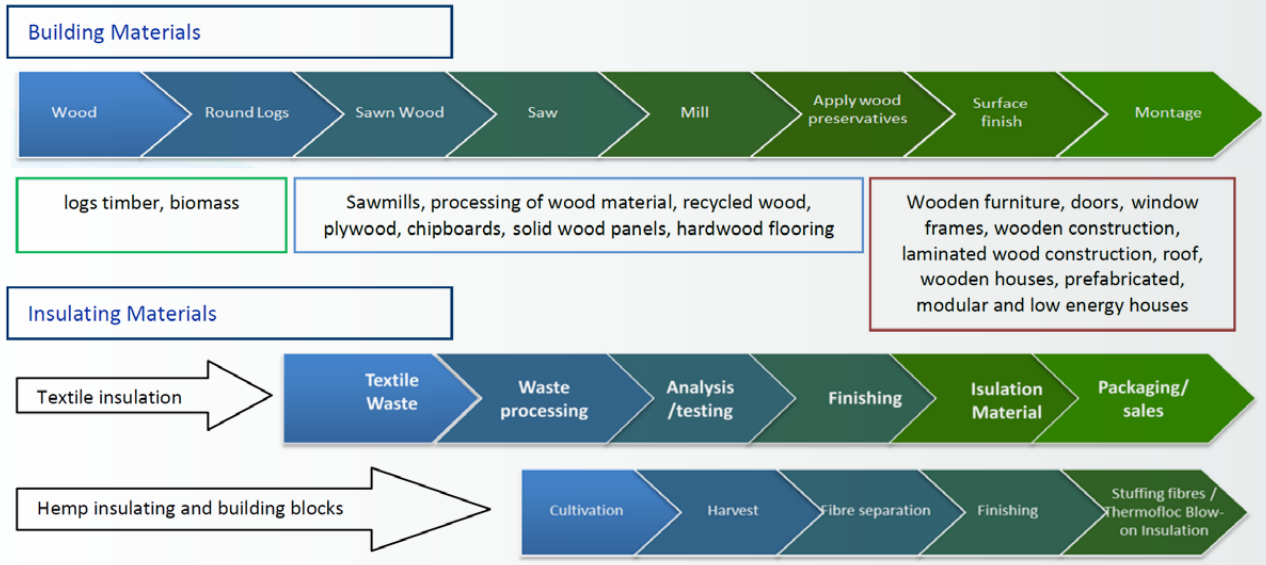
managed forest plantations with accreditations from respective certification bodies.
The respondents of the survey represent different companies within the eco-construction value chain, including primarily, wood processing companies such as: raw wood material processors; producers of semi-product – plywood, chipboards, solid wood panels, etc. –; final products- furniture, wood construction, roofs and various types of eco houses, etc. Besides wood processing, the companies that are engaged in the production of bio-based insulation materials and glue were also interviewed, including the producers of hemcrete houses and other low carbon footprint houses.

Table 2: General Information about the Companies (Cluster Actors) that were interviewed in the Value Chain Mapping Exercise in DanuBioValNet Countries, September to November 2017

Country	A	BG	CZ	HR	RO	RS	SI	SK
Number of companies	6	12	5	5	5	5	4	7
The size of the comp.	SMEs	SMEs	SMEs; Big comp.	SMEs; Big comp.	Micro and small comp.	SMEs; Big comp.	SMEs	SMEs
Ownership structure	Ltd; Family-owned	Family-owned; Ltd	Cooperative; family-owned; Ltd	Family-owned; Ltd	Partnership; family-owned; Ltd	Family-owned; Ltd	Family-owned; Ltd	Cooperative; family-owned; Ltd
Age of the companies	More than 10 years	More than 10 years	More than 10 years	More than 10 years	More than 10; 5-10: Less than 5	More than 10; 5-10: Less than 5	More than 10 years	Less than 5 years

The companies from wood processing industry that participated in the survey cover the entire value chain of the eco-construction sector, from processing of round logs to end market products. The same could be applied to bio-based insulation material, although this industry is emerging.

Figure 1: Coverage of the Interviewees along the Value Chain



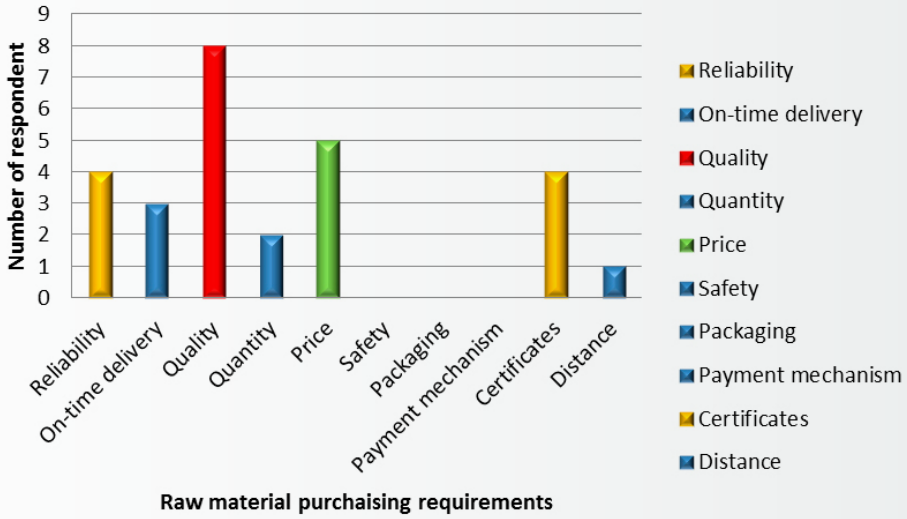
There is a strong local/regional orientation of the companies. The most respondents claimed that they sell approx. 70-80 % of their products on the home market and export 20-30 % mostly to the neighbouring countries (except for Austrian companies that sell to Scandinavia, USA, France and Croatian companies as they are mainly export-oriented). Newly established companies are 100 % home market oriented. They sell their products to end users under specific contracts, and in small regard to wholesale distributors. Most of the customers contact them directly or via some online

platforms. Participation on trade fairs is somewhat beneficial according to some respondents.
The substitutes for mentioned products are the constructions with non-renewable materials, environmentally harmful materials and industrial glues. Their products can be substituted by classic building construction but their customised production is unique.

SUPPLIERS OF THE SOURCE MATERIAL

Resource material for the eco-construction industry covers wood-based material, biomass (e. g. hemp), and recycled materials. The companies at the first part of the wood processing value chain use the raw wood material, sawdust and recycled wood. The companies at the end of the value chain use the final timber/wood products (chipboards, plywood, veneer, DTD, OSB boards, MDF, LTD, HPL – laminates) from their supplies. Textile waste is the raw material for the company that produces insulation material, and also the hemp from the farms is the resource material for insulation, facades, hemcrete houses. By-product from corn processing is used for bio-based glue.
The resource wood material comes locally (from state or privately owned forests), in small quantities from abroad – from the neighbouring countries mostly. Some respondents emphasised that import is important in some special cases (need for higher quality material – Bulgaria; tree species that are not available in required quantity in the country–Serbia).
It came out from the survey that the key requirement when purchasing wood raw material is the quality (Figure 2).
The respondents are not afraid of a lack of source materials, nor do not see big obstacles to obtain more material in the future as well. Some expect lower prices and better quality (Slovenia). In some countries (Romania and Bulgaria), the obstacle is seen in the lack of a certificated source material.

Figure 2: Key requirements when purchasing raw material; information from 47 respondents within Value chain mapping exercise



RELATED INDUSTRIES AND SUPPORT SERVICES

Several related industries can be identified. In case of the eco-insulation material: the textile industry, packaging industry (e. g. the compressed and pressed Tetra Pak cartons boards-CZ); agriculture for insulation material made of hemp, sheep wool (A, SK, HR); textile waste from automotive industry (RS). Other related industries mentioned during the interview are the producers of non-toxic paints and wood preservatives, low energy light bulbs, IT companies that are developing solutions for smart building.

Business support organisations providing the services in the region – cluster organisation and business association are specified:

A – Furniture and Timber Construction Cluster Upper Austria, and platforms like Pro Holz Austria.
BG – No business support organisations identified
CZ – National Wood Cluster, Cluster of Czech Furniture Manufacturers and the Association of Suppliers of Prefabricated Houses.
HR – Croatian Wood Cluster, the Croatian

Competitiveness Cluster of Wood Processing Industry, the Croatian Green Building Council, Panonnian Wood Centre of Competence
RO – Eco-construction cluster, Wood cluster, Sustainable energy cluster
RS – Timber cluster, Agency for wood, Construction cluster Dundjer, Green building council
SLO – Departments within National chamber of Commerce
SK – Bioeconomy Cluster, Hemp Cluster
There are research institutes and Universities that can contribute to the development of the eco-construction field with research support and other activates.

QUALITY AND LABOUR FORCE

Quality standards are very important in the region. The FSC certificate is more popular in furniture industry and required especially by customers from the West-European countries. The respondents from almost all the countries said they are FSC certified for some time. There are some exceptions: the respondents from RO said that they plan to introduce standards, and the respondents from BG claimed that only some companies have QS introduced. The construction companies follow ISO 9001 and other technical standards that are required.
PEFC certificate is randomly available and the issue with illegal cut still exists in Serbia, Slovenia and Bulgaria. PEFC is not the issue in A, CZ, HR.
Regarding the labour force of the eco-construction industry, the lack of qualified workforce is seen as the main problem of the industry. The respondents consider the low motivation of young people to work in the industry as a really big limitation. The wood-processing industry has a bad image in the public (low salary, low prospective job) and it is not interesting for young people. There is also a problem with the educational system and its structure (emphasised by SR, SI, BG).
The mismatch of the curricula and the industry needs leads to deficiency of some graduates, such as electricians, locksmiths, etc. Hemcrete-wood houses are considered as a new branch and there is a need to train the co-workers. All companies asserted that there is no educational framework for teaching qualified people who deal with eco-construction value chain explicitly, but there are several university centres that teach students in the fields that can be part of the eco-construction value chain.

COMPETITION

All respondents stated that they have competitors on all levels – regional, national and international. The toughest competition exists in the fields of certified wooden furniture, certified wood-flooring, prefabricated houses, houses made of logs and wood constructions. For A and SK companies, the main competitors are on national level. The most frequently mentioned countries considered as the "best in class" were Germany, Austria, France, Netherland, Great Britain, Denmark and Italy.

FUTURE PERSPECTIVES

With long tradition, the wood-processing industry in DanuBioValNet countries is very well developed with know-how, research capabilities, quality and design. The industry and its customers are still more price-oriented and do not think so much about the environmental impacts. The main driver in construction is still energy efficiency but the concept of resource efficiency is catching up.
Eco-construction is an emerging market in the construction industry. According to the survey, the respondents think that people will be more interested in the eco-construction products in the future. Regarding the future perspectives, all respondents see a huge potential within the eco-construction sector. The demand for environmentally-friendly products increases from year to year and due to a relatively wide variety of possible products. In some regions of Austria construction with wood is quite well established (like in Vorarlberg) and there are some best practice examples for community buildings as well as private houses.
Most of the interviewed companies are looking into the development of new technologies and innovation in wooden construction, with multi-storey wooden buildings, eco-friendly insulation (straw, paper, hemp, cellulose, and wool), composite beam design, smart eco-houses, 3D printing, etc. With the increase of new breakthrough technologies and production capabilities, costs of the eco-based composite materials and prefabricated structures will be reduced, thus making it more affordable to a wider range of customers.
One company mentioned that the transparency and cost accuracy to include disposal costs of building materials will lead to better prospects of the eco-construction industry.

The interviewed companies also try to promote the industry by themselves and they undertake some educational and awareness activities (e. g. CZ, HR, A, SR). Companies also are looking towards a more reliant government support in terms of financial incentives and strategic partnerships.

REGIONAL VALUE CHAIN NARRATIVE

According to the answers of the respondents, in general, due to the problem of vague eco-construction definition, it is difficult to define how many companies compete in the field of eco-construction. Even though most of the companies refer to their wooden products as eco-friendly, they only refer to their natural state in terms of the material (wood for instance), but they do not take into account the source – how the wood was processed.

LIST OF MAIN ACTORS/STAKEHOLDERS

The companies participated in the survey cover the entire value/supply chain of the eco-construction from processing of round logs, sawn wood, saw, mill, producers of wooden-based materials, chipboards, wooden furniture, constructions, roofs and wooden houses. The industry in the region is mature; there are many companies in the industry, particularly, there is a large number of SMEs that could not participate in the survey. A relatively small number of correspondents are not assumed as biased since they were selected based on cluster managers' suggestions regarding their good knowledge of the regional structure of industries as well as due to the fact that they are main actors in selected industries and experts in the respective sectors.

MAIN GAPS

Currently, the respondents report that their clients do not focus on eco-construction products, but are only interested in the certification and price. The „eco"-impact is not as important to them as the awareness campaigns are.
Legislation unification is also mentioned (SI); there are too demanding technical standards for wood construction; certificates are not valid across Europe alongside fire and protection requirements; and also a poor implementation of the "green" strategies is emphasised. A lack of a skilled workforce in the sector is the most mentioned obstacle by almost all respondents. Intellectual property protection related to innovative idea is an issue for pioneering companies. For the companies that plan to go internationally, the main gap seem to be the difficulties in access to the market.

MISSING LINKS

The main missing link identified within the survey is the lack of institutionalised cooperation with R&D centres; the cooperation is mainly with individual experts, rather than with organisations.

POLICY RELATED OBSTACLES

According to the interviewed companies, some financial incentives or other support measures have to be developed on both levels – national and European.
The role of the state should be more proactive and some incentives and measures for better support of eco-construction should be introduced. Some particular measures are emphasised: the unification/upgrade of the wood-construction standards (e. g. fire standards); stopping the illegal cuts, etc.
Also it is expected that the government will be more active, especially in terms of promotion of the eco-construction (green buildings) and eco-approach.

LIST OF SUGGESTED CROSS-REGIONAL COOPERATION AREAS WITHIN THE DANUBIOVALNET REGIONS

Regarding the possibility for cooperation within the Danube region, the respondents mainly consider the potential in the areas of:

Table 2: Cross-Regional Cooperation Areas identified in Value Chain Mapping Exercise in the DanuBioValNet Countries, September to November 2017

	Buying source material	Selling source material	Selling end products	Cooperation sales /large contracts	Cooperation in R&D activities.	Cross-sectoral Cooperation	Promotion of eco-construction	Cooperation in Project development
A	•			•		•		•
BG	•		•		•		•	
CZ		•		•		•		
HR						•		•
RO	•		•		•		•	
RS	•			•		•		•
SI	•			•			•	
SK							•	

Their openness to cooperation with foreign partners depends on current market conjuncture (demand) and distance (they prefer to cooperate with neighbouring countries).
The respondents see the value of the DanuBioValNet project in the opportunity to communicate the eco-construction topics and build awareness of the need and importance of the bio-based materials and production in the construction industry. It is expected that the DanuBioValNet project can play a major role in sharing the message about the benefits of the eco-construction, to shift the perception in the society and can bring public awareness of the need and importance of the bio-based materials and production in the construction industry.

THE DANUBIOVALNET PROJECT

The DanuBioValNet project is aiming at establishing bio-based industry networks across the Danube Region. The emerging transnational cooperation of clusters will foster bio-economy and eco-innovations and lead to a strengthening of the regional economies.
Consequently, with this project the partners pursue a strong strategic orientation beyond the immediate and medium-term economic objective of strengthening the regional economy. It is the strategic goal to establish cross-border strategic partnerships, particularly in developing regions, with the help of powerful cluster organisations. In this way, project results will be sustained beyond an immediate effect and the creation of strategic investments, especially in emerging industries such as the bio industry, will be enabled and facilitated. This will be achieved mainly by newly emerging or transforming value-added chains, which are increasingly being transnationally established and further developed as a result of the increasing internationalisation of value-added processes.
In this way, long-term economic effects are achieved, based on a network of agile clusters, which prepare the investment approaches in a targeted manner and implement them with high efficiency. One example of the present project is the establishment of bio-refineries in the regions, which can form a strategic technological backbone of a successful independent bio-industry.
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. With the project, a pilot function of the implementation is taken over and the prerequisite for creating a blueprint for similar and similar cross-national cooperation, also in other industries, is created.
For achieving these tasks, 17 project partners from 10 countries have joined forces. The project will pave the way from an economy based on fossil resources towards an economy using renewable resources. The striving of the partners to minimise greenhouse gases and resource-saving as well as resource-efficient utilisation of available biomasses will result in synergistic effects. These effects will improve the sustainability, regional development through diversification of the local economy and will positively affect the workforce.
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, Danube actors in bio-based industry still operate disconnected and cannot properly benefit from the potential. Therefore, the aim of this project is to develop new methods, strategies and tools to connect enterprises transnationally.
Clusters as the strong representatives of a group of industries that are closely linked by common products, markets, technologies and interests are chosen to organise and bear the industry cooperation and creation of new value chains, because they are performant and sustainable partners and guarantee the upgradeability in the dimension industry, sciences and also politics.
One of the planned outputs of this project will be the development of a Joint Bio-based Industry Cluster Policy Strategy (JBCS) to describe the procedure and to make it actionable and reusable. Furthermore, a bundle of new methods and tools to support clusters for transnational working will be developed and joint into a strategy. They will be tested in three pilot actions where it is planned to create new bio-based value chains in the Danube region.
The main target groups are on the one hand the policy – four Ministries are involved –, on the other hand clusters and their SMEs – nine cluster organisations are involved. The policy level will benefit from the JBCS, which can be used as a political framework.
The clusters and SMEs will benefit from the new innovative tools and methods developed for transnational cross-clustering. Successfully established new bio-based value chains in the pilot actions can motivate other clusters and SMEs to test this newly developed approach in the future.

The following partners commit to the implementation of the cluster partnership and transnational cooperation:

Role	Official Name in English	Acronym	Country
LP	BIOPRO Baden-Württemberg GmbH	BIOPRO	Germany
ERDF PP1	ClusterAgentur Baden-Württemberg	CA BW	Germany
ERDF PP2	Anteja ECG	ANT	Slovenia
ERDF PP3	PROUNION	PU	Slovakia
ERDF PP4	Romanian Cluster Association	CLUSTERO	Romania
ERDF PP5	Association of Business Clusters	ABC	Bulgaria
ERDF PP6	National Cluster Association – CZ	NCA	Czech Republic
ERDF PP7	Business Upper Austria – OÖ Wirtschaftsagentur GmbH – Upper Austrian Food Cluster	UAFC	Austria
ERDF PP8	Ministry of Economy	ME	Romania
ERDF PP9	Ministry of Economy, Entrepreneurship and Crafts	MEC	Croatia
ERDF PP10	Ministry of Education, Science and Sport	MIZS	Slovenia
ERDF PP11	Croatian Wood Cluster	CWC	Croatia
ERDF PP12	Institute for Economic Forecasting	IPE	Romania
ERDF PP13	Business Upper Austria – OÖ Wirtschaftsagentur GmbH – Cleantech-Cluster	BizUp	Austria
IPA PP1	Innovation Center of Faculty of Mechanical Engineering	ICME	Serbia
ASP1	Montenegro Vine Cluster	MVC	Montenegro
ASP2	Ministry of Economic Affairs, Labour and Housing Baden-Württemberg	WM	Germany

LP = Lead Partner, PP = Project Partner, IPA = Instrument for Pre-Accession, ASP = Associated Strategic Partner, ERDF = European Regional Development Fund

The Synthesis Value Chain Mapping Report Eco-construction was created by:
Zorica Maric (Innovation Center of the Faculty of Mechanical Engineering, Serbia)
Dr. Gerd Meier zu Köcker (ClusterAgentur Baden-Württemberg)
Mateja Dermastia (Poly4Eml, Slovenia)

Innovation Center of the Faculty of Mechanical Engineering
Kraljice Marije 16, 11000 Belgrade, Serbia
www.inovacionicentar.rs
zmaric@mas.bg.ac.rs, zorica.maric@gmail.com

ClusterAgentur Baden-Württemberg
im Haus der Wirtschaft
Willi-Bleicher-Straße 19, 70174 Stuttgart, Germany
www.clusterportal-bw.de
www.vdivde-it.de

Anteja ECG d.o.o.
Lambergarjeva 8, Ljubljana, Slovenia
www.anteja-ecg.com
info@anteja-ecg.com

ANNEX
VALUE CHAIN MAPPING REPORTS ECO-CONSTRUCTION

BULGARIA

1. The objective of the Regional Report

The Regional Report provides overview of the interviews conducted with the representatives of the eco-construction industry in the Bulgaria.

There are no associations or cluster initiatives in this sector of the economy and the interviews were done with different companies engaged in this field and perceived as market leaders.

The resulting report provides highlights of the tendencies and patterns that emerge from the aggregate information collected through the interviews.

2. General Information

The respondents of the survey represent different companies within the eco-construction value chain, such as sawmill, producers of wood-based materials, chipboards, construction, roofs and houses.

The companies are engaged in afforestation, logging and woodworking, produce logs, timber, biomass, solid wood panels and hardwood flooring, wood-based boards, constructive insolation panels, wooden roofs, wooden construction and prefabricated, modular and low energy houses. Most of the companies exist and produce their products for more than 10 years.

The size varies, but relatively small numbers of employees is identified – from micro to small and middle-sized companies. The ownership types of a structure are different and mainly family-owned and limited liability companies.

The respondents mentioned that usually buyers contact them directly or via some online platforms. Smaller amount reach their customers on trade fairs.

3. Suppliers of the resource material

The start resource material used for the production of the products varies as the companies have different production focus. It covers wood-based material, biomass, recycled materials, etc. The companies at the beginning of the value chain use the raw wood material (logs and timber in different quality) and process it. The companies at the end of the value chain use the timber (Sawn wood) and other wood products (panels, boards, flooring, plywood, etc.) from their supplies.

The wood material used as a resource originates mainly from the state owned forests, smaller amounts from private forests. Some of them also find the main source of their wood raw material from import to ensure the higher quality standards.

The key requirements when purchasing wood raw material and sourcing are not the same for all, but aggregated are - price, quality, on-time delivery, and certification.

The current obstacles to obtain more source material are that there is the lack of certificated source material, the payment deadlines, the availability, the quality and the price.

Their prognoses for the future regarding source material are that there will be enough logs for all sawmill capacities installed in Bulgaria and there will be enough source material (other than logs) for them and their competitors in the country. So they are not afraid of a lack of source materials and they do not oversee significant complications to acquire more material in the future as well.

4. Related industries and support services

The buyer is usually the end customer in the case of the houses, and the construction and manufacturing companies for the rest (logs, boards, panels, etc). So far the main market is our home market. The local and regional orientation of the companies is typical for the eco-construction industry in Bulgaria, and particularly the companies in the beginning of the eco-construction value chain are strongly oriented to home clients.

In terms of clients, what countries would you consider to be the most sophisticated clients? Who is ready and willing to pay better price? Who is taking the lead in promoting the use of eco-construction products – on this question there was no very appropriate answer, as most of the companies have their clients in Bulgaria.

Within the eco-construction industry, there are also no Business Support Organisations identified to provide services.

5. Quality and Labour Force

The organization of the quality management is both by suppliers taking quality measures and by measures taken at producing companies. There are companies that are certified to keep up with the quality standards but not all. The illegal cut of wood is a big issue in the Bulgaria and there are definitely steps to be taken in this direction.

Answering about the current situation regarding qualification structure of the workforce for the subsector to which the company belongs it turned out that there is lack of qualified workforce. And this is seen as a major problem of the industry. The main reason is the brain drain, but it was also mentioned that there is a low enthusiasm of the young people for working in the industry. The reputation and perception are that it is a job with small income and bad potential for personal development, so young people prefer to study in universities.

There is also a huge problem with the educational system and its structure. There is a lack of young

people graduating as specialists in the relating field. The high education in the eco-construction related fields is provided by several universities: University of Forestry, University of Architecture, Civil Engineering and Geodesy, Agricultural University of Plovdiv, Technical Universities in several cities, etc.

6. Competition

There are not so many companies according to the survey in the eco-construction sector in Bulgaria, but the respondents share that they have competitors on all levels -regional, national and international in almost all fields. There, however is bit of confusion and misunderstanding about the definition and meaning of eco-construction.

7. Future perspectives

The eco-construction industry is not so fast growing and popular currently in Bulgaria, but it is expected that there is a great perspective. For now, its production covers mainly the wood-based products (logs, timber, furniture, construction, houses), but is anticipated that other products will be involved and introduced as well. Only the big international companies will be willing to pay for the more expensive "eco" products and to build this kind of energy efficient and green houses and buildings, to promote their eco-friendly image and status. There are also some attempts from local authorities /municipalities to support the eco-construction but as it is not well defined and supported by the government – it is in the infant stage.

In Bulgaria the wood-processing industry has long traditions and main players attain great know-how, high production quality and leading design.

Overall the major clients of the wood-processing industry are still more price-oriented and do not think so much about the eco benefits or the environmental impact.

The future perspectives are connected to the increasing of the popularity of eco-friendly and green materials and way of living among the public and usage of recycled bio-based materials. This will boost the switch to more traditional, bio-based forms of construction - wooden-based buildings with eco-insulation, at the expense of the traditional brick-based constructions.

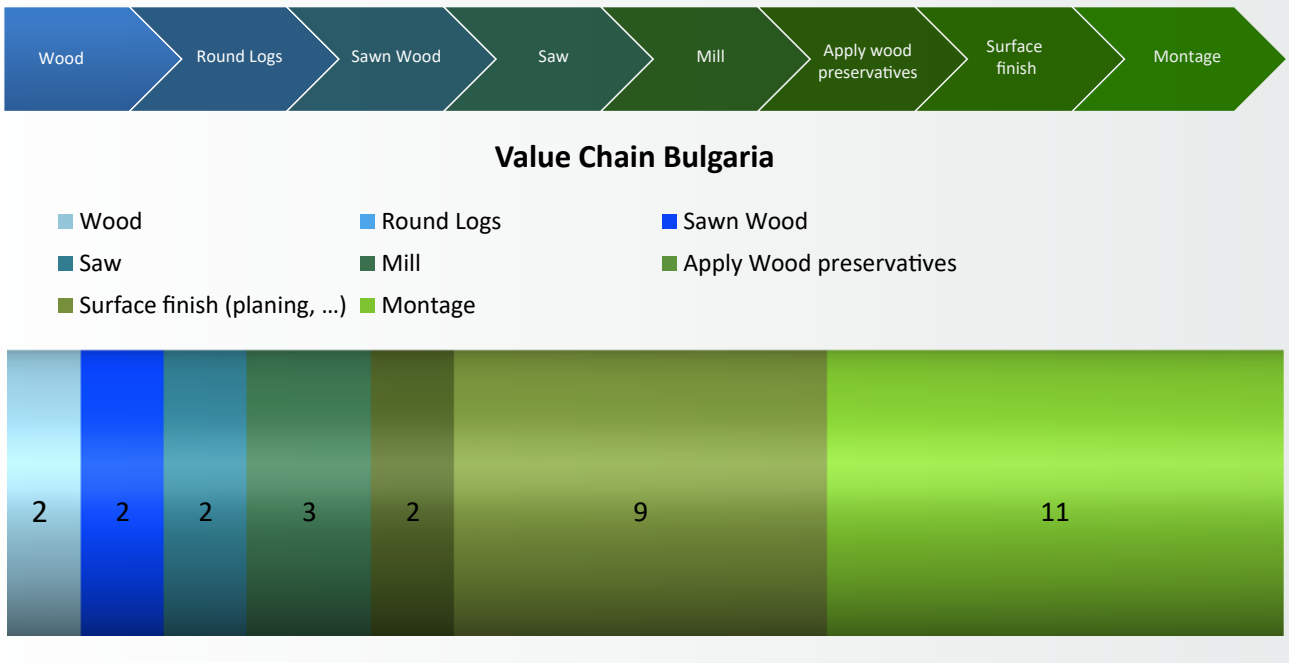
People are traditionally more accustomed to live in a brick-made houses and buildings. The public is not very familiar with the benefits of the wooden houses, and because of that not used to live in them. The change in the perception is very slow, but the popularity of the wooden houses is increasing, due to the healthier environment they create for inhabitants, the increasing affordability (price) and the better speed of the building process.

Respondents feel that there is positive direction in the people's interested in the eco-construction raw material and products in the future.

8. Regional value chain narrative

This report should present the current situation of the eco-construction value chain, however as in many other countries, in Bulgaria we have no clear definition of the term eco-construction. As participants in the DanuBioValNet project, we understand it as the construction that uses bio-based and wood materials. But the participants in the survey are not very sure what exactly it means and even some of them can't perceive their companies as a part of the eco-construction value chain. In this respect, they also comment that many companies use the hype and put in front of their names or products "eco", but this is more of a marketing trick, then about the usage of bio-based materials and environmental friendly approach.

• **Visual Map**



• **List of main actors/stakeholders**
We connected with 12 companies covering the entire value chain and representing different parts of it
Of course – there are many other companies in this industry field in Bulgaria and the entire value/supply chain is covered in our country.

• **Main gaps**
One of the main gaps is the situation with the human resources – the lack of skillful workers and the public opinion that this job is not reputable.
This is also connected with the overall perception that wooden houses are not a good option.
Also major part of the clients is concerned more about the price and certification, and do not understand the benefits of the eco-construction products and the „eco" impact on the health and society is not so important for them.
It is expected that the DanuBioValNet project can play major role in sharing the message about the benefits of the eco-construction, to shift the perception in the society and can bring public awareness of the need and importance of the bio-based materials and production in the construction industry

• **Missing links**
No missing links where found.

• **Policy related obstacles**
There are not known policies in our country that support the companies' entering the eco-construction market.

For Bulgarian companies it is very important that it has to be done more on all levels in stopping the illegal cuts. Also some financial incentives or other support measures have to be developed on both levels – national and European. Also it is really important to boost up the popularity of the eco-construction in the public eyes.
The state has to be introduce some incentives and measures for bigger and better support of eco-construction. Also it is expected that the government will be more active and to promote the eco-construction (green buildings) and eco-approach. Likewise, all persons and major players in the industry have to learn and accept the importance of developing the eco-construction value chain.

• **List of suggested cross-regional cooperation areas within DanuBioValNet regions/partners**
Regarding the possibility for cooperation within the Danube Region, the respondents see the potential mainly in the areas of:
- Buying source material
- Selling of source material;
- Selling of the end product;
- Cooperation in the end product sales activities;

The companies are interested to cooperate within the Danube Region and with the consortium of DanuBioValNet, especially in the field of communicating the message about the importance of the eco-construction topics with clients and governments and the raising the public awareness.

The Value Chain Mapping Report Eco-construction/Bulgaria was created by:
Associatin of Business Clusters
108 Rakovski G.S. Str.
fl. 3, office 313, Sofia, Bulgaria
www.abclusters.org
office@abclusters.org

CROATIA

1. The objective of the Regional Report

The Regional Report represents the summary of analysed data collected during the interviews with relevant stakeholders related to the eco-construction value chain in the Republic of Croatia. The objective of the activities performed for the Regional Report is to provide a reference framework, i.e. to identify the key gaps and constraints, as well as the promising cooperation areas within the selected VC, which should support cross-sectoral business opportunities for SMEs within Danube region. Information listed below is based on the number of cases interviewed (five). The questions asked were not limited by the questionnaire, and additional explenations and data were gained through ˝free˝ structured interview. All the interviewees are anonymous.

2. General Information

In order to gain as relevant data possible, the targeted interwees were different stakeholders, mainly companies representatives, along the eco-construction value chain: timber, solid wood panels, wood flooring, doors and windows, furniture, biomass, facades and prefabricated houses producers. The size of the interviewed companies varied, from small-sized company (11-50 employees), middle-sized company (51-250 employees) to big-sized companies (more than 250 employees), as well as the ownership structure, from family-owned company to big family corporate and corporate. The majority of interviewed companies have a long tradition of production (more than 10 years).

2. Suppliers of the Source Material

Since the majority of forests in Croatia (75%) are state owned, the raw material (logs, round logs, biomass) is provided mainly by the Croatian state public company Croatian Forests Ltd. Some raw material comes from the private forest, but in smaller amount, due to the fragmentation of private forestland and devastated forests. The lack of raw material is compensated also by imported raw material from neighbouring countries (mainly Austria). Indirect consequence of the proclaimed principle that the raw material should be obtained first of all by the 'finalists' forces the 'sawmills' to invest in final production. This causes a production structure in wood processing and furniture production characterized by vertical integration within a business entity, similar to a combinate type from a planned economy. The absence of the market of timber raw materials and primarily processed timber in the Republic of Croatia, obliges business entities to deal with almost all stages of wood processing, which includes increased investment and high fixed costs, which are discouraging for new entities to deal with final production. The companies at the end of the value chain use the final timber/wood products (chipboards, plywood, veneer, DTD, OSB boards, MDF, LTD, HPL – laminates) from their supplies. Some companies supply material from the Croatian sawmills. 90% of the raw material is of domestic origin. The wood sector is mainly export-oriented (Italy, Germany and Slovenia).

4. Related Industries and Support Services

Cross-sectoral cooperation in eco-construction is possible with other industries, for example textile industry, especially in the use of domestic wool for several reasons: 1) solving the problem of wool disposal (the issue of redemption is not resolved) 2) providing quality materials with high added-value 3) possibility of branding and certification of such products.

There is evident need of production, R&D and exchange of best practices in that field. Agriculture products (straw, hemp, jute, etc.) also have a great potential of use in construction as thermal insulation material, eco-panels and insulation material.

Within the eco-construction industry, there are also business support organisations providing the services to their members (companies, universities, public bodies), such as the Croatian Wood Cluster, the Croatian Competitiveness Cluster of Wood Processing Industry, the Croatian Green Building Council. There are research activities of universities dealing with eco-construction, which can support the industry as (e.g. Faculty of Civil Engineering University of Zagreb, Faculty of Architecture University of Zagreb, etc.). On the policy level, the Ministry of Construction and Physical Planning is important for the legislative support of the eco-construction.

5. Quality and Labor Force

Croatia certified its state-owned forests ten years ago, with FSC certificate, which gives evidence that the forest is managed sustainable, congruently to arranged standards. Since then, there is a constant growth of the number of FSC certificates, which indicates that the Croatian wood industry has followed certification market trends. There are also PEFC certificates issued, mainly with companies engaged in trading with or belong to paper industry.

The main supplier, the state company Croatian Forests (CF) is responsible for determining the prices of forest products, which is constantly causing great disagreement between raw material suppliers CF and the wood processing companies. Regarding the buyers of the products of the interviewed companies, they are mainly the end users, retail and wholesale. Customized production is also important (example of costumized and unique building with wood -> Panonnian Wood Centre of Competence).

The interviewed companies expressed interest to adapt their business to new market surrounding and challenges, taking into consideration cross-sectoral collaboration possibilities and innovative products. On the other hand, cross-sectoral collaboration is mirrored in the fact that the priority level of R&D topics in education and training programmes is mostly rated as below average or even poor. The interviwees are facing obstacles in finding the qualified workforce who will lead and implement the innovation activities in the companies. They believe that the main reason is that the educational programmes don't put enough accent on the importance of innovations and R&D topics. Another important reason is that the companies are mostly situated in the rural areas, that are not so attractive, especially for young people. The language barrier is also quite a big challenge to overcome, particularly in the cross-regional projects. However, the development of new products with added-value by using EU financial funds and programs is definitely an opportunity for the companies.

6. Competition

There is a high intensity of rivalry, especially in the low profitable areas of the wood processing industry. Furniture industry is oriented mainly on export and therefore experiences the most-challenging export markets. The most prominent export market for Croatian furniture producers is Germany. Competition includes low quality products from Asia or quality and design products from Italy and Germany.

7. Future Perspectives

Reflect on the reported levels of interest in the existing and potential value chain as well as any outsourcing interests expressed.

There is a higher demand for eco-products and eco-construction at the developed global markets, and lately this trend is visible in Croatia. According to the results, there are not so many companies dealing with eco-construction (building with wood, eco-insulation, hemp-based products, recycled bio-based materials, etc.) in Croatia, but this is expected to grow in upcoming years. There is an evident need to meet the public audience with the benefits of renewable energy sources use, as well as other recycled or waste materials that are not harmful to nature, and its innovative ways of applications in the construction itself.

Related companies sould be aware that, apart from the aforementioned environmental impact, eco/green construction leads to new investment opportunities, new high-tech occupations and jobs, and of course a positive change in relation to health, resources and capital costs at micro and macro level.

At the policy level, it is necessary to adopt programs that promote energy efficiency in the construction standard, especially considering a possible measurable contribution to meet the EU's goals in the field of climate protection.

8. Regional value chain narrative

The entire value/supply chain is covered in the Republic of Croatia.

State and private forests

Sawmills, processing of wood material, recycled wood, chipboards

Wooden furniture, doors, wooden construction, roof, wooden houses

Five stakeholders participated in the survey representing different parts of the value chain – processing of round logs, sawn wood, sawmill, producers of wooden-based materials, chipboards, wooden furniture, constructions, roofs and wooden houses. There are many other companies in this industry in the Republic of Croatia that have not participated in the survey. The Faculty of Architecture, University of Zagreb, as a knowledge centre focusing on eco/efficient/green construction, also provides relevant information within the survey.

There is entire value/supply chain covered in the Republic of Croatia. There is an evident lack of producers of prefabricated houses, but there are no missing links identified within the survey. At the moment the majority of the active companies on the market are small, and mostly familiy-owned.

The highest activity in implementing innovations is in the subsector of doors and windows production, the lowest activity in implementing innovations is in sawmill industry, and the best sales results of all FBI sectors and subsectors has wood flooring.

There are three biggest challenges detected to overcome in implementing more innovation in the business are:

- Lack of interest, motivation and ideas by coworkers,
- Lack of market research on customers needs,
- Lack of in-sectoral collaboration (collaboration between FBI sectors and subsectors).

The collaboration between companies and supporting structures (government, professional associations, clusters, technology parks,

educational system) regarding R&D and innovations is fair and the three biggest issues are: - Lack of communication on R&D and innovation themes, - Lack of direct state funding, - Lack of interest, motivation and ideas by supporting structures.

There are no actual projects of cross-sectoral collaboration and innovation processes and the respondents see the value of the DanuBioValNet project in the opportunity to communicate the eco-construction topics and build awareness of the need and importance of the bio-based materials and production in the construction industry.

The biggest opportunities in eco-construction are seen:
- Market positioning on national market and international markets
- Globalization of the world market
- Image of wood as ecological and renewable material, as well as other waste and recycled materials
- Growing popularity of using eco-products
- Cross-sectoral collaboratio and development of new products with added value by using EU financial funds and programs

The Value Chain Mapping Report Eco-construction/Croatia was created by:
Associatin of Business Clusters
Croatian Wood Cluster
Krsnjavoga 1 (Westin II/208)
10000 Zagreb, Croatia
www.drvniklaster.hr
projekti@drvniklaster.hr
Ministry of Economy, Entrepreneurship and Crafts of the Republic of Croatia
Ulica grada Vukovara 78
10000 Zagreb, Croatia
www.mingo.hr
paulina.tomaskovic@mingo.hr

CZECH REPUBLIC

1. The objective of the Regional Report
The objective of the Regional Report is to provide overview from the interviews conducted with representatives of the eco-construction industry in the Czech Republic. The report should serve to highlight the tendencies and patterns that emerge from the aggregate information collected through the interviews. To reach the particular respondents, the contacts and networks of the Cluster of Czech Furniture Manufacturers and the National Wood Cluster were used.
The summary statements relating to the topics listed below are based on the total number of cases interviewed. All the respondents are anonymous.

2. General Information
The respondents of the survey represent different companies within the eco-construction value chain, such as sawmill, producers of wood-based materials, chipboards, wooden furniture, construction, roofs and houses.
The companies produce logs, timber, biomass, solid wood panels, doors and windows, furniture, wood-based boards, agglomerated wooden materials, chipboards, SBD boards, OSB boards, wooden roofs, wooden construction and prefabricated houses. They produce their wooden products for more than 10 years.
The size of the interviewed companies is various, from small-sized company (11-50 employees), middle-sized company (51-250 employees) to big-sized companies (more than 250 employees). The types of ownership structure are also different including production cooperative, family-owned company, big family corporate, association of owners (corporate) and limited liability company.

3. Suppliers of the resource material
Resource material for the eco-construction industry covers wood-based material, biomass (e.g. hemp), natural insulation and recycled materials. Due to the different specialisation of the interviewed companies, the resource materials are, of course, various. The companies at the first part of the value chain use the raw wood material (logs, round logs of lower diameters, timber in different quality) and process it. They use also

the lower-quality wood which cannot be used as timber, sawdust and recycled wood (recycled furniture). The companies at the end of the value chain use the final timber/wood products (chipboards, plywood, veneer, DTD, OSB boards, MDF, LTD, HPL – laminates) from their supplies.
The resource wood material comes mainly from the Czech state owned forests, private forests and Czech supplies (sawmills). Some of them also import the source material from abroad (e.g. recycled material/furniture from Germany, Austria).
The respondents are not afraid of a lack of source materials because there is a bark beetle calamity in the Czech Republic currently. And they do not see big obstacles to obtain more material in the future as well.

4. Related industries and support services

The local/regional orientation of the companies is characteristic for the eco-construction industry in the Czech Republic. Especially the companies in the first part of the eco-construction value chain are strongly locally/regionally oriented. According to their answers, the foreign customers are not willing to pay higher price for their material (logs, timber) and additional travel costs are unacceptable for them to stay competitive. That is the reason why they are not developing their internationalisation activities.
The interviewed companies mention that the share of their sales on the home market is approx. 75% and export is 25%, in general. They export the products to Germany, Austria, Slovenia, Greece, Hungary, Slovakia and Switzerland.
Several related industries can be identified. In case of the eco-insulation material, the textile industry has the potential to produce wool or recycled textile/fabric for the eco-construction. In addition, other recycled materials can be reused as a part of eco-buildings, e.g. the compressed and pressed Tetra Pak cartons boards (packaging industry) that are already used in practice.
Within the eco-construction industry, there are also Business Support Organisations providing the services to their members (companies, universities, public bodies), such as the National Wood Cluster, the Cluster of Czech Furniture Manufacturers and the Association of Suppliers of Prefabricated Houses. Also the research activities of universities dedicated to eco-construction can support the industry as (e.g. the University Centre for Energy Efficient Buildings of Technical University in Prague, the VŠB - Technical University of Ostrava - Faculty of Civil Engineering, etc.).

5. Quality and Labour Force

The buyers of the products of the interviewed companies are mainly the end customers, then retail, wholesale (big furniture producers, Hornbach), and also the specific contracts (customized production - furnishing of offices, hotels) are very important. The respondents reach their customers on trade fairs; still the most of the customers contact them directly or via some online platforms. Their products can be substituted by classic building construction but their customized production is unique.
Quality standards are very important in the Czech Republic. Especially the PEFC certificate is strongly required. The FSC certificate is more popular in furniture industry and required especially by customers from the West-European countries. The suppliers of the resource material apply the quality control systems (sawmills have to guarantee the quality of the wood - PEFC) and the companies have also their quality standards within the processing. In this context, the illegal cut of wood is not a big issue in the Czech Republic.
Generally, the price of the products is the most important issue for the respondents, followed by quality and export/import distance.
Regarding the **Labour force** of the eco-construction industry, the lack of qualified workforce is seen as the main problem of the industry. The respondents see the low motivation of young people for working in the industry as a really big limitation. The wood-processing industry has a bad image in the public (low salary, low prospective job) and it is not interesting for young people (they prefer studying at universities to manual work). There is also a problem with the educational system and its structure (a lack of graduates in the fields they need, such as electricians, locksmiths, etc.).
The education in the eco-construction field is provided by several universities: the Mendel University in Brno, Czech Technical University in Prague, University Centre for Energy Efficient Buildings of Technical University in Prague, VŠB - Technical University of Ostrava, etc. The interviewed companies also try to promote the industry by themselves and do some educational and awareness activities (e.g. the Wood for Life Foundation, Wooden Academy and Wood Festival).

6. Competition

According to the answers of the respondents, there are not so many companies in the field of eco-construction in the Czech Republic (but there is a problem of eco-construction definition in general). On the other hand, the respondents state that they have competitors on all levels (regional, national and international) and mention the companies in the fields of certified wooden furniture, certified wood-flooring, prefabricated houses, houses made of logs and producers of wood constructions. As the international competitors, they mention the Hungarian, Polish (with worse product quality but cheaper), Portuguese, Italian (high quality and design), Chinese (furniture sector) companies.
The respondents consider the countries of

Scandinavia, Switzerland, Austria, Germany, Great Britain, China (furniture), and Portugal as the leaders and the most sophisticated clients.

7. Future perspectives

The eco-construction industry is fast-growing and popular. Currently, its production covers mainly the wood-based products (logs, timber, furniture, construction, houses) and its number is increasing. In the case of passive/energy efficient/green buildings, primarily the big international companies are willing to pay for the more expensive "eco" products and to build this kind of buildings to promote their eco-friendly and eco-oriented approach (the eco-image of the companies play a substantial role). There are also some efforts of the municipalities to support the eco/green construction but it is still sporadic.

In general, the wood-processing industry and its customers are still more price-oriented and do not think so much about the environmental impacts.

The future perspectives of the industry suppose a larger spreading of the wooden-based buildings in the Czech Republic as the competition to the traditional brick-based constructions. Also the popularity of eco-friendly materials is expected to increase among public and the experts predict a return to more traditional, bio-based forms of construction (eco-insulation, hemp-based products, recycled bio-based materials, etc.).

According to the survey, the respondents think that people will be more interested in the eco-construction products in the future.

8. Regional value chain narrative

The Czech wood-processing industry has a long tradition and local companies have specific know-how, high quality of products, great tradition and excellent design.

Historically, the Czech society is not used to live in wooden houses due to the tradition of brick houses building. People are still distrustful of wooden construction but it is changing slowly and the number of wooden houses is increasing. It is mainly thanks to the better availability of the wooden houses in the Czech market, acceptable price and very fast building process in comparison with the building of brick houses.

This report should present the current situation of the eco-construction value chain. First of all, it is important to mention that the term "eco-construction" is not defined in the Czech Republic. For the purpose of the DanuBioValNet project, we understand it as the construction using all bio-based materials (mainly wood). But the respondents of this survey often do not know what it means exactly and some of them have a problem to see themselves as a part of the eco-construction value chain. In this context, they also mention that there are many companies that declare that they are „eco" but, according to them, it is more about the marketing then about the environmental friendly approach.

· **Visual Map**

The entire value/supply chain is covered in the Czech Republic.

• **List of main actors/stakeholders**

Five companies participated in the survey representing different parts of the value chain – processing of round logs, sawn wood, saw, mill, producers of wooden-based materials, chipboards, wooden furniture, constructions, roofs and wooden houses.

Anyway, there are many other companies in this industry in the Czech Republic that have not participated in the survey. The University Centre for Energy Efficient Buildings of Technical University in Prague, as a knowledge centre focusing on eco/efficient/green construction, also provides relevant information within the survey.

• **Main gaps**

As was already mentioned, the entire value/supply chain of the eco-construction is covered in the Czech Republic. In general, the interviewed companies are more regionally/nationally oriented but some of them are more or less interested in foreign markets. Nevertheless, the companies which are interested in the foreign markets already do their business there.

Currently, the respondents report that their clients do not focus on eco-construction products, they are only interested in the certification and price. The „eco" impact is not so important for them.

The respondents see the value of the DanuBioValNet project in the opportunity to communicate the eco-construction topics and build awareness of the need and importance of the bio-based materials and production in the construction industry.

• **Missing links**

There are no missing links identified within the survey.

• **Policy related obstacles**

According to the interviewed companies, some financial incentives or other support measures have to be developed on both levels – national and European. Also they see as important to boost up the popularity of the eco-construction among the public.

The role of the state should be more proactive and some incentives and measures for better support of eco-construction should be introduced. The state government has also to tackle the overall theme in order to be interested in and promote the eco-construction (green buildings) and eco-approach. The consistency of attitudes of the state is crucial (to say things that are actually applied in practice). Moreover, all persons in the industry have to learn and accept the importance of the eco-construction value chain development.

Regarding their needs and wishes, the respondents require the unification/upgrade of the wood-construction standards (e.g. fire standards).

• **List of suggested cross-regional cooperation areas within DanuBioValNet regions/partners**

Regarding the possibility for cooperation within the Danube Region, the respondents see the potential mainly in the areas of:

- Selling of source material;
- Selling of the end product;
- Cooperation in the end product sales activities;
- Realisation of joint projects and getting large contracts (especially in the furniture industry).

Their openness to cooperation with foreign partners depends on the amount of contracts/business value (currently they have sufficient demand) and distance (they prefer to cooperate with neighbouring countries, such as Slovakia, Germany and Austria).

They are also interested in the next steps of the DanuBioValNet project, especially in the field of the awareness building (communication the eco-construction topics with customers and ministries). However, they do not see the interconnection of the companies in this field as real.

The Value Chain Mapping Report Eco-construction/Czech Republic was created by:
National Cluster Association
U Tiskarny 616/9, 702 00 Ostrava, Czech Republic
www.nca.cz
info@nca.cz

ROMANIA

1. The objective of the Regional Report

For the eco-construct value chain is to provide an overview of the results from the interviews conducted with the representatives of the end-market firms and suppliers.

The report highlights the tendencies that emerge from the aggregate information collected through five interviews with representatives of the eco-construction industry in Romania. The five respondents were reached through the Romanian Cluster Association (Clustero). The summary statements relating to the topics listed below are based on the total number of cases interviewed.

2. General Information

Describe the types of firms and product focus in order of importance. Similarly, the respective categories of supplier inputs should also be described in order of importance.

Five end-market firms which are members in four clusters were interviewed:

- One of the clusters covers the whole eco-construction value chain and representatives of two of its firms were interviewed.
- One of the firms is producing building materials and is member in an eco-construction cluster.
- One firm is producing log houses and is member in a wood cluster.
- One of the firms in producing low carbon footprint houses - earth is member in a cluster in the fields of renewable energy, energy efficiency and the new sustainable energy.

Already doing business in the Eco-construction sector: There is a unanimous positive answer to this question, all the interviewed firms are in the eco-construction sector.

Size of companies: Two companies are micro, while the other three are small. No medium or big companies were surveyed.

Ownership structure: The companies are family owned, one is a partnership and one company.

Annual turnover: Most (four) firms have an annual turnover less than 1 mil EUR, while only one is better with an annual turnover between 1,1 and 5 mil EUR.

Experience in producing the listed products (in years): Two firms have more than 10 years of experience, two between 5 and 10 years and only one has less than 5 years of experience.

List of products: More often the firms produce wooden roofs and prefabricated houses (3/5), then wood flooring, doors and windows, and facades (2/5) and only one firm produces solid wood panels and another one produces low carbon footprint house - earth architecture. No production of logs, timber, furniture, biomass and insulation material.
Available substitutes for their product: Firm 1: Yes, but not eco Iron/PVC; Firm 2 and 3: NA; Firm 4: Their concept is unique in Romania; Firm 5: Other type of prefabricated houses.
List of start material used: One firm use as start material both logs and timber, two of them use only timber, one uses only logs, while one firm did not specify it.

PRODUCT QUALITY
Organizing product quality management: With respect to the management of the product quality, most of the firms have their own quality measures (4/5), while one firm relies on the quality measures of suppliers.
Quality certification: Two firms plan to introduce certificates in less than 2 years, one works with ISO, while two of them have no quality certificates.

BUYERS
List of buyers: All firms sell their products to the end customers, while only one of them sells also to retail, wholesale and contracts/projects.
Ways to get new cooperation with customers: All the firms get new customers through direct contact (5/5). Also, online platforms are important (3/5). Trade fairs in Romania are not widely used for this field of eco-construction (1/5).
Export: Only two firms export 30% of their production, both to Germany, while one exports also to Italy and Macedonia.
Most sophisticated client-country: Firm 1: Germany; Firms 2 and 3: NA; Firm 4: France; Firm 5: Italy.

3. Suppliers of the resource material

Include a breakdown regarding main criteria for sourcing as well as any supply gaps reported. Also, describe the general geographical distribution of the sourcing of inputs.
Main source of wood raw material (input): For two of the firms, the main source for the wood raw material is state owned forests. One of these firms, is using also wood from private forests and imported. The rest of three firms have only one source, namely private forests (1/5) or an 'other' unspecified source (2/5).
Firm's prognoses for the future regarding source material for their product: The prognoses are moderately positive (3/5) that will be enough logs for all sawmill capacities installed in Romania and enough source material (other than logs) for all the firms in the field (the respondent and the competitors). One firm did not answer this question and two of them had mixed options (one YES and one NO).
Key requirements when purchasing wood raw material: In what regards the key requirements when purchasing wood raw material, all firms look first for quality (ranked 5 by 5/5). Also, highly ranked (5) are quantity, reliability, and on-time delivery. Second highest ranking (4) are on-time delivery, price and the payment mechanism. Lowest importance have packaging (rank 2) and certificates (rank1). The payment mechanism is ranked lower (2) when quality and price are ranked higher (5 and respectively 4).
List of the current obstacles to obtain more material: Firms must overcome different obstacles in their current activity. The high ranking (5 and 4) obstacles are the availability of the raw material, its quality and its price. Other obstacles of decreasing importance are the payment deadlines and the lack of a certificated source material.

4. Related industries and support services

A description of the most prominent value-added activities reported should be included as well as any prominent examples of expansion plans and related obstacles.
The most prominent value-added activities are: solid wood panels, wood flooring and wooden roof.
The companies complain about the lack of supporting policies of innovation and entrepreneurship and field-related education of the labor force, appropriate communication with public institutions (local and national authorities), and the insufficient funding public schemes.

5. Quality and Labour Force

Include a description of the most reported types of contractual arrangements involving producers and suppliers. Additionally, include a general assessment of the state of the labor force qualifications and training needed. It is of relevance to know of the general interest in outsourcing any of the current value-added processes involved.
Qualification structure of the workforce for their subsector: Most of the producers (4/5) face a lack of qualified workforce.
Reasons for the lack of qualified workforce: The main reasons for the lack of the qualified workforce are brain drain, the bad image of the wood processing and connected industries, and a low motivation of the young people for working in that industry. It was also mentioned the urban attraction for youth.
Existence of an educational framework in Romania for teaching qualified people, who deal with eco-construction value chain: There is a unanimous negative answer to this question, there is no educational framework in Romania for teaching qualified people, who deal with eco-construction value chain.

6) Competition

Provide a list of competitors and best-in-class per product areas

Competitors: One firm has regional, national and international competitors, one has both national and international competitors, one has both regional and national competitors and two have only regional competitors.

Leading firms and leading countries in their field: Companies in France that are well established in the earth architecture market and another company in Romania producing log houses.

7) Future perspectives

Reflect on the reported levels of interest in the existing and potential value chain as well as any outsourcing interests expressed.

Companies in Romania that produce some kind of products that are in the eco-construction value chain: In Romania there are firms that produce some kind of products that are in the eco-construction value chain: house made of logs, prefabricated houses, insulation materials, certified wood flooring, and certified wooden roof constructions.

Having possibilities to develop the business in the direction of eco-construction value chain: There is a unanimous positive answer to this question, all the interviewed firms could develop in the direction of eco-construction value-chain.

Estimation of the potential of the Romanian market for eco-construction products in the next 5–10 years: The potential of the Romanian market for eco-construction products in the next 5–10 years is estimated to have a likely increase due to people being moderately interested (4 on a scale of 5 with 5 extremely interested) in eco-construction products (3/5).

NO outsourcing interests were expressed.

8) Regional value chain narrative

• **Visual Map** that illustrates the way the product flows from raw material to end markets and shows the type and number of regional actors involved in all value-added activities in your regionWe consider important to mention the **Understanding of the term eco-construction:** The term eco-construction is related more often to building using renewable materials (4/5) and materials non-harmful to the environment (3/5). Less often the term is related to building with wood material or resource efficient construction (2/5). Only one firm associated eco-construction to green building.

material, buying source material, and cooperation in the end product sales activities. None of the interviewed Romanian firms are interested in buying end products or to cooperate in R&D activities along their value chain in the Danube Region.

- List of main actors/stakeholders, their position, and activities in the VC
  - Among companies using as main source of the wood raw material, 2 use state owned forests, 2 use private forests, 1 from imports and 2 from other sources;
  - Among companies using as start material for the production, 2 use logs, 3 sawn wood;
  - As for the type of products they produce we have: wooden roofs and prefabricated houses 3 companies, wood flooring, doors and windows, and facades 2 companies, 1 firm produces solid wood panels and 1 produces low carbon footprint house - earth architecture.

- Main gaps (for example in technology, standards, IPR, workforce, access to market, suppliers, regulation)

Two questions list the gaps in policies and suggest improvements:

Are there any policies in Romania that support the companies' entering on the eco-construction market? If yes, name in which sector: Three firms are not aware of any such policies, while the other two are sure there are none.

Changes/improvements in the value chain to buy more source material in order to develop business activities toward eco-construction value chain (ECVC)?: Suggestions for changes/improvements in the value chain to buy more source material in order to develop business activities toward eco-construction value chain (ECVC): incentives and measures for bigger support of ECVC and expert and institutional push of ECVC at EU level (2/5); learning and accepting the importance of developing the ECVC and educating the customers for a better understanding of the health and environmental impact of some building materials (1/5).

- Missing links and/or key stakeholders

No production of logs, timber, furniture, biomass and insulation material. Not reported use of biomass or other sources (such as clay, raw earth, various building materials) as start material.

- Policy-related obstacles from a cross-regional cooperation point of view

From your point of view, what has to be done or changed on regional and EU policy level to push the eco-construction market on European level forward?: Suggestions for changes/improvements at regional and EU policy level to push the eco-construction market on European level forward: financial incentives and expert and institutional push of ECVC at EU level (2/5); boost up the popularity of ECVC and educating the customers (1/5).

- List of suggested cross-regional cooperation areas with DanuBioValNet regions/ partners

Are you interested in further cooperation along your value chain in the Danube Region? If yes, name in which sector: Most firms (4/5) are interested in further cooperation along their value chain in the Danube Region to sell their end product. A lower interest (1/5) is for selling source material, buying source material, and cooperation in the end product sales activities. None of the interviewed Romanian firms are interested in buying end products or to cooperate in R&D activities along their value chain in the Danube Region.

The Value Chain Mapping Report Eco-construction/Romania was created by:

Institute for Economic Forecasting
Calea 13 Septembrie 13,
050711 Bucharest, Romania
www.ipe.ro, carmenbpauna@gmail.com

Ministry of Economy, Romania
Calea Victoriei 152, 010096 Bucharest, Romania
www.economie.gov.ro, gabriela_pirvu@economie.gov.ro

Romanian Cluster Association
Ion Ionescu de la Brad 6
013813, Bucharest, Romania
www.clustero.eu, contact@clustero.eu

SERBIA

1. The objective of the Regional Report

The objective of the Regional Report is to provide overview from the interviews conducted with representatives of the eco-construction industry in Serbia. The report should serve to highlight the tendencies and patterns that emerge from the aggregate information collected through the interviews. The summary statements relating to the topics listed below are based on the total number of cases interviewed. All the respondents are anonymous.

To reach the particular respondents, the contacts and networks of the Timber Cluster, Belgrade and Dundjer construction Cluster, Niš were used and five important companies dealing with Eco-construction were interviewed. Four of them are producing wooden material for interior and exterior furnishing of houses; two of them are in a production of insulation material. The companies are selling their products through contracts/ projects, three of them also to wholesalers. The share of the sales on the home market is high, from 70-90%.

State owned forests are the main source of material for all companies; the companies that use coniferous as a raw material, mainly import it from Austria and Bosnia. The obstacle to obtain more material is low level of technology of the state own forests company, but the prognoses for the future regarding the logs availability is optimistic, based on ongoing investments to the state own forests company.

Regarding the related industries, the companies mentioned the variety of industries that they are cooperating with in developing the product for the end-market. In relation to supporting activities helping the companies, all mentioned the importance of the associations that are helpful for the influence on regulation and lobbing for incentives.

All companies have quality standards implemented; the first quality management measures are taken at the company. The companies that are engaged in wood processing reported the lack of qualified workforce.

In relation to the competition topics, the companies stated that they are rather small and have many competitors on regional and international level. In their opinion, Scandinavia and Germany have the most sophisticated clients who are ready and willing to pay better price.
Regarding the future perspectives of the eco-construction market, all companies estimated the potential of the national market in the next 5–10 years as moderate.
All companies are interested to cooperate with the Danube Region and with the consortium of DanuBioValNet. Some areas of special interests were addressed in the first contact, such as: buying source material, selling buying end product, cooperation in R&D activities, cooperation in the end product sales activities.

2. General Information
The companies produce solid, beach and coniferous wood panels (3 companies), wood flooring, doors and windows (2 comp.), laminated wood construction (1), wooden roof (2), insulation material (2), recycled textile waste (1) and facades (2). Concerning the size, there are one big corporation, family-owned three SMEs and one micro company. The companies are experienced in dealing with the particular products, three of them more than 10 years, one 5-10 and one (recycled textile waste) less than 5 years. All of the companies are selling their products through contracts/projects, three of them also to wholesalers and one directly to the end customers. The share of the sales on the home market varies from 70% (3 companies) to 90% (2 companies). The countries where they export are: EU (Germany, Austria Belgium, Spain, France, Denmark, Sweden, Slovakia, Czech Republic, Italy), Balkan region (Macedonia, Montenegro) and other countries (Japan, USA, Kazakhstan, Russia). The annual turnover of the companies in 2016 is 1,1 to 5 mil. EUR (3 companies) and under 1mil. EUR (2comp).

3. Suppliers of the resource material
The inputs for the companies' production are logs (2 companies) and timber – sawn wood (2companies). State owned forests are the main source of material for all companies, only two purchase materials from private forests. The companies that use coniferous as a raw material, mainly, import it from Austria and Bosnia. Textile waste material is the raw material for the company that produces insulation material. The main criteria when purchasing raw material are for all companies, the reliability and FSC certificates. Then comes: on-time delivery, quality and quantity. The price is mentioned as a third in importance.
The obstacle to obtain more material is the availability of the wood raw material. The companies stressed that the reason for this is not the lack of timber, but the low level of technology when it comes to state own forests company and small average size of lots in privately owned forests which does not allow the sustainable management. The companies engaged in insulation material production pointed out the undeveloped market for the final product. The companies agreed that there will be enough source material other than logs. The prognoses for the future regarding the logs availability for all sawmill capacities is also optimistic (based on going investments to the state own forests company), only one company express their doubts.

4) Related industries and support services
Several related industries were identified. In case of the eco-insulation material, the textile industry has the potential to produce wool or recycled textile/fabric for the eco-construction and, other recycled materials is reused as a part of eco-buildings such as textile parts from automotive industry. Other related industries mentioned during the interview are the producers of non-toxic paints and wood preservatives, low energy light bulbs, IT companies that are developing solutions for smart building.

All companies expressed the opinion about the role of supporting associations unanimously. The associations are helpful for the influence on regulation e.g. in stopping the illegal cuts, state introduction of some incentives and support measures, etc. About the role of R&D centres, the companies stated on a more general view that they are important, but direct contact to their clients is of more importance to them. They are relevant research activities of universities dedicated to eco-construction (e.g. the Faculty of Forestry, Faculty of Technology, Faculty of Mechanical Engineering, Faculty of Civil Engineering), the companies sporadically cooperate with.
The companies stressed the need for policies that support the companies' entering on the eco-construction market. Regarding the question who is taking the lead in promoting eco-construction products, the companies answered that there are at the moment no public funding available or they have no knowledge of it. All is done by the companies itself.

5) Quality and Labor Force
The companies that deal with wood processing implemented FSC quality standard for 5 or more years ago. The construction companies follow ISO 9001 and other technical standards required.
All companies stated that the first quality management measures are taken at the company, although state own Forest Company has FSC quality standard that is required especially by customers from the West-European countries. With the private forests the situation varies. PEFC certificate is randomly available and the issue

with illegal cut still exists. That's why the reliability and the certificates are the most required while purchasing supply material.
The three companies that are engaged in wood processing pointed that there is a lack of qualified workforce. The reasons for that are in low motivation of the young people for working in the industry sector and the mismatch between the curricula and industry needs. The construction companies reported that there is no lack of qualified workforce.
All companies asserted that there is no educational framework for teaching qualified people who deal with eco-construction value chain explicitly, but there are several university centres that teach students in the fields that can be part of the eco-construction value chain.

6) Competition

The three wood processing companies didn't quote any specific competitor but stated that they are rather small and have the competitors on regional and international level. The two companies in construction sector are competing on national level. Regarding the questions about substitutes for the products, the answer is that there are many products that are not based on "eco" materials and procedures that can satisfy the needs, but on different level. The "best in class" in the area, in the opinion of the companies, are companies from Austria and Germany.
Regarding the questions what countries would be the most sophisticated clients and who is ready and willing to pay better price, Scandinavia and Germany were stated as such.

7) Future perspectives

The current production covers mainly the wood-based products (logs, timber, furniture, construction, houses) and the market is increasing. In the case of passive/energy efficient/green buildings, the market is emerging, but led more by foreign companies' buildings who want to invest in their "eco-friendly image". From the companies' point of view, some financial incentives or other support measures have to be developed both, on regional and EU policy level to push the eco-construction market forward. Companies, projects and policy have to boost up the popularity of eco-construction in the public. All of the companies estimated the potential of the national market for eco-construction products in the next 5–10 years as moderate.
To the question how they get new cooperation with customers, the companies answered that it is done on the trade fairs or buyers contact them directly.
All companies are interested to cooperate with the Danube Region and with the consortium of DanuBioValNet. Some areas of special interests were addressed in the first contact, such as: buying source material, selling buying end product, cooperation in R&D activities, cooperation in the end product sales activities.

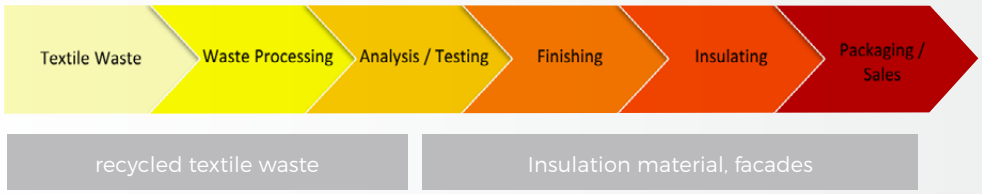
8) Regional value chain narrative

Serbia wood-processing industry has a long tradition and local companies have specific know-how, high quality of products, tradition and excellent design. Historically, the traditional Serbian rural house is made of wood. Thanks to the availability of the wooden houses in the market, acceptable price and very fast building process in comparison with the building of brick houses, the market increases. But the term eco-construction is not defined in Serbia and, in the respondents' opinion, is used for the marketing purposes primarily. The respondents often do not see themselves as a part of the eco-construction value chain. For the most of them the eco–construction means resource efficient construction with biodegradable materials.

- Visual Map illustrating the way the product flows from raw material to end markets and shows the type and number of regional actors involved in all value-added activities in Serbia

BUILDING MATERIALS

INSULATING MATERIALS



• **List of main actors/stakeholders, their position, and activities in the VC**

Five companies that participated in the survey and presented on the map are the members of two active cluster organizations, covering the VC starting from sawn wood. Three companies are wood processing companies, produce wood panels, wood flooring, doors and windows, laminated wood construction, wooden roof and two are engaged in the production of insulating material and facades. Anyway, there are many other companies in this industry in Serbia that have not participated in the survey.

• **Main gaps (for example in technology, standards, IPR, workforce, access to market, suppliers, regulation)**

The main gaps seems to be the difficulties in access to the market, since the entire value/supply chain of the eco-construction could be covered in Serbia. In general, the interviewed companies are more regionally/nationally oriented but some of them are more or less interested in foreign markets and they do their business there (on average, 30% of their sales). The respondents stated that there is a need for policy to boost up the popularity of eco-construction in public and see DanuBioValNet project as the opportunity to build awareness of the need and importance of the bio-based materials and production processes in the construction industry.

The lack of qualified workforce in wood processing industry, supply of particular wood species for the construction is also mentioned as a gap.

• **Missing links and/or key stakeholders**

Key stakeholders that the companies mentioned are the producers of suitable technologies for smart building, producers of non-toxic paints and wood preservatives, low energy light bulbs, etc; the links that are missing are those to R&D institutions.

• **Policy-related obstacles from a cross-regional cooperation point of view**

Some financial incentives or other support measures have to be developed on both levels – national and European to boost up the popularity of the eco-construction among the public, according to the respondents.

• **List of suggested cross-regional cooperation areas within DanuBioValNet regions/partners**

Possibility for the cooperation within the Danube Region, suggested by the respondents:

- Promotion of eco-construction,
- Buying source material,
- Selling end product,
- Buying end product,
- Cooperation in R&D activities,
- Cooperation in the end product sales activities

The Value Chain Mapping Report Eco-construction/Serbia was created by:
Innovation Center of the Faculty of Mechanical Engineering
Kraljice Marije 16, 11000 Belgrade, Serbia
www.inovacionicentar.rs
zmaric@mas.bg.ac.rs
zorica.maric@gmail.com

SLOVAKIA

1. General Information

Although Slovakia has one of the largest forest areas in the EU (41% share of total land area) and there is critical mass of wood suppliers, there are not so many producers of 100% eco-products. Except of wood, the other materials used for the eco-production are as follows: hemp, straw, clay and corn. The companies interviewed within DanuBioValNet project are focused on the production of insulation hemp material, facades, logs, hemcrete houses and also on the production of bio-based glue. The identified companies are members of either Hemp Cluster or Bioeconomy Cluster, both operating in Slovakia.

All firms are selling their own brands, mainly to the wholesalers, end-customers and also the contracted partners that have defined specific requirements. The activities of all respondents are oriented to the domestic market, whereby companies do not consider the expansion to foreign markets yet. The main reason is that all respondents have dealt with the production of particular products for less than five years (in some cases even less than 1 year) and their annual turnover in 2016 was less than 5 million € (less than 1 million €). The ownership structure have varied – from family owned structure to corporations and cooperatives.

In relation to the explanation of the term eco-construction, the answers of respondents were as follows:

1. Building with renewable materials
2. Building with environmentally non-harmful materials
3. Green building (partially)

The main target groups in the area of eco-construction are "enthusiasts", eco-friendly middle class, people willing to have cheap and fast built houses, but also modern architects, etc. The respondents get new cooperation with customers on trade fairs, through direct interactions and also via some online platforms.
Other companies producing some kind of products that are in the eco-construction value chain, but have not been interviewed (only mentioned by respondents) are dealing with the houses made of logs, prefabricated houses and certified wooden doors and windows.

2. Suppliers of the resource material
The main source of raw material for companies dealing with the hemp material and the construction of hemp-wood houses are private forests, fast-growing tree farms and hemp farms. Within the Hemp Cluster, there are 30 farmers that grow the plants in the area of 480 ha. The start material used for the production of identified hemp products are the hemp straws. On the other hand, the main source of the raw material for the company processing the bio-based glue is its internal source of corn and potentially also the supplies from other companies/ cooperatives. The start material for the production of natural glue is a by-product (natural polymer) that is formed during the processing of corn in dry conditions, with the use of special technology.
The most frequently mentioned key requirements when purchasing raw material were quality, reliability, on-time delivery and prices, whereby in some cases the ecological factors are taken into account too. However, the current obstacles to obtain more material are related mainly to the payment deadlines and the quality of raw material.
The predictions of all respondents regarding the availability of source materials in the country are positive – they expect enough source materials for them and even for their competitors.

Related industries and support services
Although the eco-construction covers wide range of products, respondents are focused mainly on the production of insulation hemp material, facades, logs, hemcrete houses and also on the production of bio-based glue.
In general, respondents cooperate more with individual experts, rather than with the R&D centers in Slovakia. Furthermore, there is no educational framework for teaching qualified people, who deal with the eco-construction value chain.
In terms of policies that support companies' entering the eco-construction market, there is the Regional Innovation Strategy for Smart Specialization in Slovakia, concretely the Domain Healthy Food & Environment. One company also mentioned that their private customers willing to have houses made of logs from Slovak woods provide them some kind of support (was not specified).

3. Quality and Labor Force
The quality of raw material is considered as very important and the majority of respondents states that their suppliers have regular product quality measures. Only one respondent answered that first measures are taken at his company. Regarding the quality standards in companies, there was a slight difference in answers. On one hand, companies have EU-certificates for material or use other quality standards, such as "individual responsibility in the process chain". On the other hand, companies use also ISO certificates (e.g. 9001:2001).
The interviewed companies do not provide any kind of external trainings for their staff – employees are trained within the companies. However, there is a problem with the human resources – companies state there is a lack of qualified workforce. Two main reasons for given shortage were mentioned:

1. Young people do not want to stay in the rural areas / low motivation of young people for working in the industry sector;
2. Hemcrete-wood houses are considered as a new branch and there is a need to train the co-workers.

4. Competition
In the area of eco-construction, respondents claimed no/not significant competition on regional or national level. Although the majority of companies have not made a market research on international level and have only little information about foreign companies dealing with similar products, they see a big potential in the area of eco-construction and do not consider it as a challenge.
The substitutes for mentioned products are the constructions with non-renewable materials, environmentally harmful materials and industrial glues.
The most frequently mentioned countries considered as the "best in class" were Germany, Austria, France, Netherland, Great Britain, Denmark and Italy.

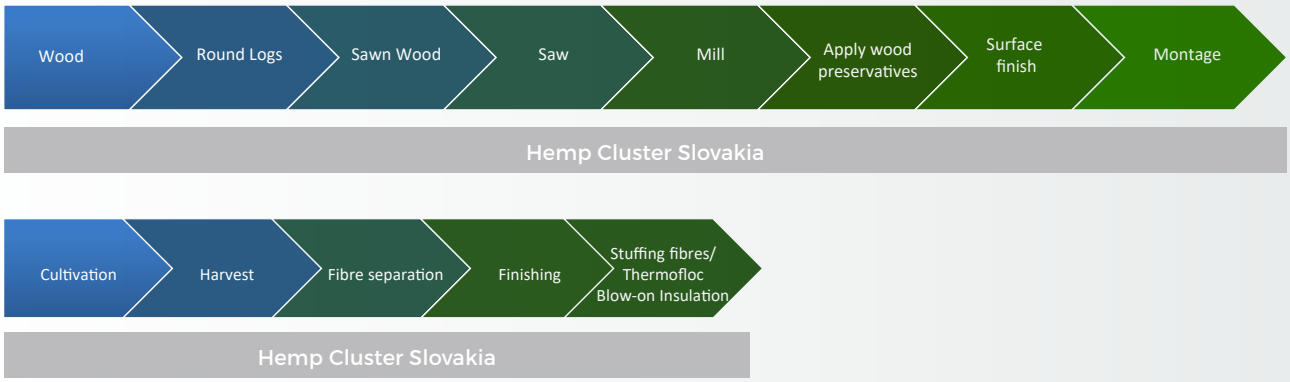
5. Future Perspectives
Regarding the future perspectives, all respondents see a huge potential within eco-construction sector. The demand for environmentally-friendly products increases from year to year and due to relatively wide variety of possible products (prefabricated houses, insulation materials, hemcrete houses, hemp-wood houses, bio-based glue, etc.), companies expect interest (somewhat/moderate/extreme) of people in the eco-construction products. However, the majority of companies currently face some limitations in relation to qualified workforce and need to train the employees.
In relation to the question what has to be done or changed on regional and EU policy level to push the eco-construction market on European level forward, the majority of respondents answered that some financial incentives or other support measures have to be developed on both levels. In addition, questionnaires also revealed the necessity to boost up the

popularity of eco-construction value chain.
In order to develop business activities toward eco-construction value chain, respondents suggested following improvements:

1. The government has to introduce some incentives and measures for bigger support of eco-construction value chain;
2. All persons in the value chain have to learn and accept the importance of developing eco-construction value chain;
3. In the case of hemp based industry, the government has to support regional associated value chains.

6. Regional Value Chain Narrative

Visual map that illustrates the way the product flows from raw material to end markets and shows the type ad number of regional actors involved in all value-added activities in the region:



- **List of main actors/stakeholders, their position, and activities in the VC**
  - Bioeconomy Cluster
  - Hemp Cluster

In general, interviewed Slovak organizations are included in the whole value chain from cultivation to stuffing fibres/thermofloc blow-on insulation and from round logs to montage.

- **Main gaps (for example in technology, standards, IPR, workforce, access to market, suppliers, regulation)**
  - Lack of qualified workforce
  - Company processing the bio-based glue has no patents yet, the company plans to apply for the intellectual property protection related to given innovative idea

- **Missing links and/or key stakeholders**
  - Cooperation mainly with individual experts, rather than with organizations such as R&D centers

- **Policy-related obstacles from a cross-regional cooperation point of view**
  - The issue of the exploitation of agricultural products for non-food processes

- **List of suggested cross-regional cooperation areas within DanuBioValNet regions/partners**
  - All companies showed the interest in further contacts to DanuBioValNet project and relevant partners (if Prounion as a project partner will act as an intermediary)

The Value Chain Mapping Report Eco-construction/Slovakia was created by:
PROUNION a.s.
Piaristická 2, 949 01 Nitra
Slovak Republic
www.prounion.sk
info@prounion.sk

SLOVENIA

1. The objective of the Regional Report

Regional Report's aim is to provide a summary of the interviews conducted with representatives of the eco-construction sector in Slovenia. The report is an aggregate of the information gotten through the interviews and represent opinions of the interviewed respondents from the eco-construction. Answers also serve to highlight emerging patterns. Respondents are all part of the wider network of wood-based products producers and members of Wood Industry Cluster, Construction Cluster of Slovenia and other business associations. The summary statements relating to the topics listed below are based on the total number of cases interviewed. All the interviews were conducted on anonymous basis.

2. General Information

Interview based questionnaire was answered by representatives of 4 companies. These companies produce wood-based prefabricated houses, doors, window frames and other products and are Small-Medium Enterprises, from 12 to 250 employees. Main activities of the companies are defined by the following NACE (Statistical Classification of Economic Activities) codes: C16.100, C16.230, F41.100 and F43.330. Two of the companies produce prefabricated houses exclusively, while other two also produce window frames, doors and other products. All of the companies have wood-based products in their portfolio and are looking to expand or develop new eco-friendly products. Representatives from all of the companies stated that development of the eco-friendly products is costly, but market is growing due to increasing public awareness and better material specifications and quality. All four companies sell their products directly to end consumers, with one company also supplying wholesale retail chains. Only one company from the sample of interviews is family owned, other three are commercial companies. Interviews companies have a long tradition of producing and selling their products in the respected market, over 10 years.

3. Suppliers of the resource material

All companies reported that their source materials are logs and sawn wood (timbers) from long-lasting wood (spruce, beech). Three companies stated that they get the source material from local private forestry companies and one from export, mainly from Austrian sawmills. In general, the main criteria are the price, quality and reliability. For a better perspective, most of the companies in the first part of the value chain export products (usually source material) to other countries, and companies in the last part (producers of prefabricated houses) import some of their source material stock. For future perspectives, regarding the availability of source wood-based material, companies stated that they expect lower prices and better quality.

4. Related industries and support services

In terms of related industries, we can identify a number of them. There is a push in the construction industry to promote recycling and reuse of building material, and in case of the eco-insulation material, there is a potential to expand established production capabilities (wool, recycled textile/fabric) for the eco-construction. In terms of government support, Strategic Research and Innovation Partnerships were made, with one of the priority areas tackling Smart buildings and homes, including wood chain. Within the eco-construction industry, there are also Business Support Organizations providing the services to their members, such as the Section of Slovenian Manufacturers of Wooden Prefabricated Buildings and Section of Slovenian Sawmills, Primary Processors of Timber and Sawn Timber Dealers, which are part of Chamber of Commerce. Research institutes and Universities also contribute to development of the eco-construction filed with research support and other activates (e.g. University of Maribor Faculty of Civil Engineering, Transportation Engineering and Architecture, University of Ljubljana Faculty of Civil Engineering and Geodesy).

5. Quality and Labor Force

Interviewed companies mostly sell their products to end users and in small regard to wholesale distributors. Because of this, the quality is of high importance and all of the companies have strict measures in place to insure it. Three of the companies stated that they have certificates, although only one answered that they have the FSC certificate and ISO 9001. Interviewed representatives all agreed with the statement of insufficient skilled work force and they see a problem arising in the near future, because of low motivation of young people for working in the industry. Manual labor has a bad image with young people, who prefer not to do it or specialize in more research and development areas – leaving a gap in the qualified workforce demand.

6. Competition

For local markets, the four companies did not specify exact competitors, but with data, gathered from cluster landscape of the region, the eco-construction market is interesting for traditional construction companies. Especially in terms of raised interest in foreign markets. This will be a very competitive European and global market, which will grow in size in the future. For questions about substitutes for the products or about best-in-class per product area only two companies answered and listed competitive products and brands. They see competition mostly on the national level, with one of them listing also a few foreign competitors. As for question, regarding what countries would be the most sophisticated clients and who is ready and willing to pay better price, companies stated that clients from Germany, Austria and Switzerland are willing to pay more for better

quality, and clients from Italy are more interested in design value of their products.

7. Future perspectives

Eco-construction is an emerging market in the construction industry. With the increase of new breakthrough technologies and production capabilities, costs of the eco-based composite materials and prefabricated structures will be reduced, thus making it more affordable to wider range of customers. Slovenian companies in this sector enjoy increase in sales and will probably increase export efforts. Most of the interviewed companies are looking into development of new technologies and innovation in wooden construction, with multi-storey wooden buildings, eco-friendly insulation (straw, paper, cellulose, and wool), composite beam design, smart eco-houses, 3D printing, etc. Companies also are looking towards a more reliant government support in terms of financial incentives and strategic partnerships.

8. Regional value chain narrative

With long tradition, wood-processing industry in Slovenia is very well developed with some key actors in the regional industry. Good know-how, research capabilities, quality and design are all part of the pedigree. Thus wood-based structures and other housing products are very popular. Even though most of the companies refer to their wooden products as eco-friendly, they in term only refer to their natural state of the material (wood for instance), but not take into account the source – how the wood was processed.

- **List of main actors/stakeholders**
  - Four interviewed companies represent the middle and the last part of the value chain (end market of the eco-construction value chain).
  - There are many other companies in this industry that haven't been included in the interviews
  - Research institutes and Universities (mainly University of Maribor Faculty of Civil Engineering, Transportation Engineering and Architecture, University of Ljubljana Faculty of Civil Engineering and Geodesy) play an important role in research and development activities and getting funding through the EU framework programmers.

- **Main gaps**
  - Eco-construction value chain is well developed in Slovenia; with major emphasis on export. All of the companies But they stated that the demanding technical standards for wood construction, certificates not valid across Europe; alongside fire and protection requirements and poor implementation of the "green" strategy.
  - Companies also stated that Lack of a skilled workforce in this sector – motivation of young people to work in this branch/sector – would become a dominant issue in the near future, requiring hiring of foreign experts and workers. This will also affect job security and have socio-economic impacts in the region.

- **Missing links and/or key stakeholders**
  - No missing links were reported.

- **Policy-related obstacles from a cross-regional cooperation point of view**
  - Slovenia's Smart Specialization Strategy and Circular Economy guidelines are very much focused on "green and smart" buildings with already formed Strategic Research and Innovation Partnerships. Interviewed companies reported that more should be done on all levels (public and industry) in stopping the illegal cuts.
  - They also stated that the State should be more proactive with new incentives and support measures.
  - Public view and opinion should be raised to boost popularity and awareness regarding eco-construction as a whole, and to promote its benefits.

- **List of suggested cross-regional cooperation areas within DanuBioValNet regions/partners**
  - Buying source material.
  - Selling end market products.
  - Cooperation in the end product sales activities.
  - Cooperation in R&D activities.
  - Strengthening the cooperation of partner companies with educational and research organizations and creative industries.

The Value Chain Mapping Report Eco-construction/Slovenia was created by:

Ministry of Education, Science and Sport
Masarykova cesta 16, 1000 Ljubljana
Slovenia
www.mizs.gov.si
gp.mizs@gov.si

Anteja ECG d.o.o.
Lambergarjeva 8,
Ljubljana, Slovenia
www.anteja-ecg.com
info@anteja-ecg.com

UPPER AUSTRIA

1. Short Summary of the Regional Report

This report aims to assess the situation of Eco-construction in Austria based on 6 interviews. It is intended to give an overview of the current situation and future development. So it should stress what are the biggest challenges and obstacles at the moment and what must be done to strengthen the sector both in Austria and in Europe. To reach the particular respondents, the contacts and networks of the Furniture and timber construction cluster Upper Austria were used.

Eco-construction companies in Austria are mostly SME's with regional markets and direct contact to their customers. Therefore, the internationalization plays a minor role. Nevertheless, there is interest in collaborating within the Danube Region in order to sell the end product.

2. General Information

Most of the companies interviewed are more than 10 years in business. They offer a wide range of products and produce solid wood panels, wood flooring, facades, wooden roofs, prefabricated houses. The buyers are mostly end consumers, only two of them mentioned wholesale and retailers as their customers.

Only two are exporting, therefore the export rate lies between 20 – 30%. Export countries mentioned are Germany, Italy, Spain, France, Croatia, Serbia, Slovenia, Greece, Albania, Denmark, Norway, Sweden, USA and Pakistan.

Most of the companies are SME's run as corporations, only two of them are family owned.

The annual turnover in 2016 was 1,1 – 5 mil. Euro (3) and more than 10 mil. Euro (3).

3. Suppliers of the resource material

The main source of the wood raw material is timber (sawn wood) from private forests. Only two out of six companies stated import and state owned forests as their source for raw material.

The mentioned key requirements when purchasing raw material are reliabillity, on-time delivery and quality. Price and quantity are less important. Therefore the given obstacles to obtain more material are lack of quality and no certificates.

Interestingly there is no lack of raw material in general expected, but companies have doubts, if there are enough logs for all sawmill capacities installed.

4. Related industries and support services

All interviewed companies are already active in the business of Eco-construction. Related industries might be the production of insulation material. There are some companies in Austria producing insulation material made out of hemp and wood fibre as well as sheep wool. But they are not organized in clusters like the wood industry.

Within the eco-construction industry, there are also Business Support Organisations such as the Furniture and Timber Construction Cluster Upper Austria and platforms like Pro Holz Austria. ProHolz Austria is the marketing agency of the Austrian forestry and timber industry. The aim is to communicate
the ecological, economic and constructional advantages of wood as a material and to stimulate its increased use.

Only two companies use support services like online platforms. Most customers contact them directly.

5. Quality and Labor Force

Quality is a big issue. Most of the companies interviewed have some kind of certificate (PEFC, FSC, ISO). Good quality is also one of the key requirements when purchasing raw material. Therefore, lack of quality is one of the current obstacles to obtain more material.

There are divergent answers about the lack of qualified workforce. Three out of six companies stated that there is a lack. Reasons are low motivation of the young people for working in the industry sector.

The same picture shows regarding the educational framework in Austria. Only one company could name an adequate university course for eco-construction with wood.

6. Competition

As the main market for Eco-construction lies within Austria the competition is more on a regional level. Therefore, some competitors are mentioned, they are mainly in the business of carpentry, prefabricated houses and timber construction. Also, retailers are competitors, both on a regional and on a national level.

Leading countries for eco-construction are Austria (region of Vorarlberg), Swizerland, partly Germany and Skandinavia.

7. Future perspectives

In some regions of Austria construction with wood is quite well established (like in Vorarlberg) and there are some best practice examples for community buildings as well as private houses. The main driver in construction is still energy efficiency but the concept of resource efficiency is catching up.

Regarding the future perspective three companies believe that people will be extremely interested in the eco-construction products.

In order to strengthen the industry, following answers were given:

What has to be done or changed on regional and EU policy level to push the eco-construction market on European level forward?

– We have to boost up the popularity of Eco-construction value chain in the public

What needs to be done/improved in the value chain that you can develop business activities toward eco-construction value chain (ECVC)?

– The state has to introduce some incentives and measures for bigger support of ECVC.
– All persons in the VC have to learn and accept the importance of developing of ECVC.

One company mentioned the transparency and cost accuracy to include disposal costs of building materials. This might be an issue for the future as in Austria the concept of a circular economy is becoming more and more important.

8) Regional value chain narrative

In Austria the whole value chain can be covered. As mentioned above there is no lack of raw material for eco-construction in general although quality might be an issue. The interviewed companies are all in the business of timber construction so they see themselves as part of the eco-construction value chain.

· Visual Map

• List of main actors/stakeholders

Six companies participated on this survey. They are producing end consumer products like wood flooring, facades, wooden roofs, prefabricated houses.

• Main gaps

– Quality of raw materials is not given
– Certificates are missing

• Missing links and/or key stakeholders

– Better cooperation in selling end product
– Suppliers of hiqh quality raw material

• Policy-related obstacles

– Lack of support for the eco-construction business

• List of suggested cross-regional cooperation areas within DanuBioValNet regions/partners

– Three out of six companies asked are interested in (further) cooperation within the Danube Region
– The main interest is selling the end product, cooperation in R&D activities and cooperation in the end product sales activities
– One company also mentioned buying raw materials

The Value Chain Mapping Report Eco-construction/Upper Austria 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