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Framework and good practices for multi-stakeholder and cross-sector interconnections

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Project Overview BIOBRIDGES is a 24 months action aiming at boosting the marketability of bio-based products - BBPs by establishing close cooperation and partnership between bio-based Industries - BBI, brand owners and consumers' representatives. The ultimate goal is to stimulate and support the active engagement of and interaction among all stakeholders (including local communities and local authorities) and improve market acceptance of BBPs.

BIOBRIDGES will design and implement replicable methodologies, procedures and good practices supporting multistakeholders' interaction, leading to new cross-sector partnerships. Main activities will be:

- Identify the cooperation challenges among consumers, brand owners and BBI
- Create a sustainable multi-stakeholder community involving consumer representatives, BBI and brand owners from different bio-based economy clusters and stimulate dialogue and cooperation
- Following a co-creation approach, increase consumers' and brand owners' awareness, confidence and trust on the benefits of BBPs compared to the fossil-based counterparts,
- Support the establishment of at least 2 new cross-cutting interconnections in bio-based economy clusters and define replicable procedures and good practices leading to the establishment of new cross-sector partnerships and business opportunities
- Stimulate the multi-stakeholder discussion toward pre-and co-normative research, new standardisation/labelling and emerging co-creation models (B2B and B2C).

At the end of the project, at least 2 new cross-sector interconnections in bio-based economy cluster will be established, while the foundations for the creation of new ones based on the arguments, best practices and recommendations deriving from the project will be formed.

The BIOBRIDGES consortium merges a variety of complementary expertise, aiming to build a consistent multi-actor approach integrating 9 partners already involve in other projects like BLOWAYS, BIOVoices and BIOSTEP.

Consortium	Estonia	Civitta Eesti As	Italy	FVA Sas Di Louis Ferrini & C
	Greece	Q-PLAN INTERNATIONAL ADVISORS PC	Germany	Ecologic Institut gemeinnützige GmbH
	Italy	Agenzia Per La Promozione Della Ricerca Europea	Croatia	Particula group d.o.o
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DRAFT

1. EXECUTIVE SUMMARY

This report is part of Work Package 2 “Cross-sector cooperation framework assessment – challenges and good practices” of the Biobridges project. It describes the work carried out under Task 2.2 “Review of multi-stakeholder and cross-sector interconnections in bio-based economy clusters at national and regional level”. Its focus is to identify good practices in multi-stakeholder and cross-sectoral collaboration among the 18 bioeconomy-related clusters and similar initiatives featured in the case studies.

Clusters in Portugal, Italy, the Netherlands and Germany provide some of the clearest examples of good practices for multi-stakeholder and cross-sectoral collaboration:

- The BlueBio Alliance in Portugal offers support to startups working in the “blue bioeconomy” (marine and coastal bioeconomy) through the Blue Demo Network, which promotes and makes accessible a set of Portuguese infrastructural supports for startups - these range from access to offices or laboratories for biotech and biochemistry to business incubators.
- The Spring cluster in Italy fosters the development of partnerships carrying out research activities along the entire bioeconomy value chain, equally involving public and private entities in calls for proposals at the regional, national and Horizon 2020 level.
- A Dutch subsidy regulation offers local governments and their partners expert support for the implementation of projects focused on greenhouse gas reduction and the circular economy.
- Since 2012 the region Central Germany has received additional funding from the Federal Ministry of Education and Research (BMBF) to develop Central Germany as a focal point for bioeconomy activities.

The clusters’ main challenges include:

- lack of dedicated bioeconomy strategies and/or legislative support mechanisms
- lack of national funding opportunities
- raw material supply shortage and lack of skilled workforce
- limited integration of bioeconomy products in mainstream supply chains
- lack of entrepreneurial culture
- difficulties in cross-sectoral collaboration due to logistical and “cultural” differences among sectors (differing financial models, ways of thinking etc.)

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2. INTRODUCTION

The bioeconomy covers many different sectors (agriculture, forestry, fisheries, food production, pulp and paper production, as well as parts of the chemical, biotechnological and energy industries¹), policy domains and stakeholders with different interests and goals. Due to this heterogeneity, the development of a sustainable, inclusive and balanced bioeconomy requires a holistic approach with broad multi-stakeholder and cross-sectoral collaboration. Opportunities for such collaboration can be found especially at the regional level, around areas where biorefinery plants are located² and regional clusters play a crucial role in providing such collaboration opportunities.³

Bioeconomy development depends strongly on the capacity of relevant actors from different domains and sectors to engage with each other in order to build new bio-based value chains.⁴ Since the availability of biomass is often crucial for bioeconomy development, related clusters often need to integrate producers of biological resources (e.g. farmers and fishermen) as well as their associations (e.g. cooperatives).⁵ The ability of the stakeholders to create these new networks or adapt existing ones varies among regions. Therefore, the dissemination of good practices of multi-stakeholder and cross-sectoral collaboration and of instruments that support this as well as facilitation of knowledge sharing across European regions is crucial.

Against this background, this report provides an overview of 18 regional and national bioeconomy or bioeconomy-related clusters and similar initiatives across Europe - it tracks their strategies⁶ for supporting bio-based businesses and facilitating multi-stakeholder and cross-sector cooperation for the development of bio-based products (BBPs) aligned with consumers' needs. Their incentives include economic instruments, government funding, policies and regulations, information campaigns, etc.

In summary, the document:

- draws out good practice examples of successful collaborations among sectors and stakeholders with high replication potential
- identifies challenges that hinder collaboration between sectors and stakeholders
- formulates guiding questions for the upcoming co-creation activities in Biobridges

Building upon the results from deliverable 2.1 "Cooperation challenges among consumers, brand owners and bio-based industry" about the importance of the creation and maintenance

¹ European Commission (2012): Innovating for Sustainable Growth: A Bioeconomy for Europe. Luxembourg: COM/2012/060 final.

² Hasenheit M., Gerdes H., Kiresiewa, Z., Beekman, V. (2016): Summary report on the social, economic and environmental impacts of the bioeconomy.

³ Spatial Foresight, SWECO, ÖIR, t33, Nordregio, Berman Group, Infyde (2017): Bioeconomy development in EU regions-Mapping of EU Member States'/regions' Research and Innovation plans & Strategies for Smart Specialisation (RIS3) on Bioeconomy for 2014-2020.

⁴ Gerdes, H., Kiresiewa, Z. et al. (2017): BioSTEP Policy Paper: Creating Networks for the Transition to a Bio-based and Circular Economy. Ecologic Institute, Berlin.

⁵ Spatial Foresight, SWECO, ÖIR, t33, Nordregio, Berman Group, Infyde (2017): Bioeconomy development in EU regions-Mapping of EU Member States'/regions' Research and Innovation plans & Strategies for Smart Specialisation (RIS3) on Bioeconomy for 2014-2020.

⁶ The term "strategy" covers regional clusters and policy documents such as action plans, national or regional strategies, and policy measures that operate at different levels and vary in terms of their specific characteristics. Regional clusters tend to be shaped by several actors and networks in a specific region, often in less formal ways - policy documents on the other hand are more closely related to bioeconomy policy-making in a formal way. (Overbeek et al. 2016).

of novel networks for the bioeconomy - but at the same time very challenging - this report highlights successful examples of collaboration that may be replicated across EU regions. It complements deliverable 2.1 by providing additional information on existing challenges in terms of multi-stakeholder and cross-sectoral collaboration faced by the regional and national clusters examined under Task 2.2.

The work undertaken in Task 2.2 will inform the next steps of the project, namely the focus group discussions in Task 2.3, the Biobridges Platform in WP4, the national and regional co-creation events under WP5, and the recommendations and lessons learned in WP6. More importantly, the results of D 2.2 (in particular the case study specific challenges) will form the basis for policy debates at local and regional level.

The report is structured as follows.

- The next chapter (Chapter 3) outlines the research methodology and provides definitions of key terms.
- Chapter 4 gives a comparative overview of the main characteristics of the clusters at national and regional level.
- Chapter 5 outlines main challenges and good examples of multi-stakeholder and cross-sectoral collaboration identified in the cluster analysis.
- Chapter 6 draws conclusions and suggests guiding questions for the national and regional co-creation events under WP5.

3. METHODOLOGY

This report analyses 18 regional and national⁷ bioeconomy or bioeconomy-related clusters and similar initiatives such as platforms, working groups and associations in countries represented by the Biobridges consortium. It builds upon the results of a previous analysis of 14 regional clusters across 10 European countries carried out under the BioSTEP project⁸. The map below gives an overview of the geographical distribution of the selected clusters.

⁷ The main focus of D2.2 is on regional clusters; but for smaller countries and countries with a limited numbers of regional clusters the analysis has been extended to the national level.

⁸ One of the main objectives of BioSTEP was to identify and disseminate best practices on the participatory development of national and regional bioeconomy strategies. More information about the project can be found here: <http://www.bio-step.eu/biostep/about-biostep/> and about the cluster analysis here:

http://www.bio-step.eu/fileadmin/BioSTEP/Bio_documents/BioSTEP_D2.3_Review_of_strategies.pdf.

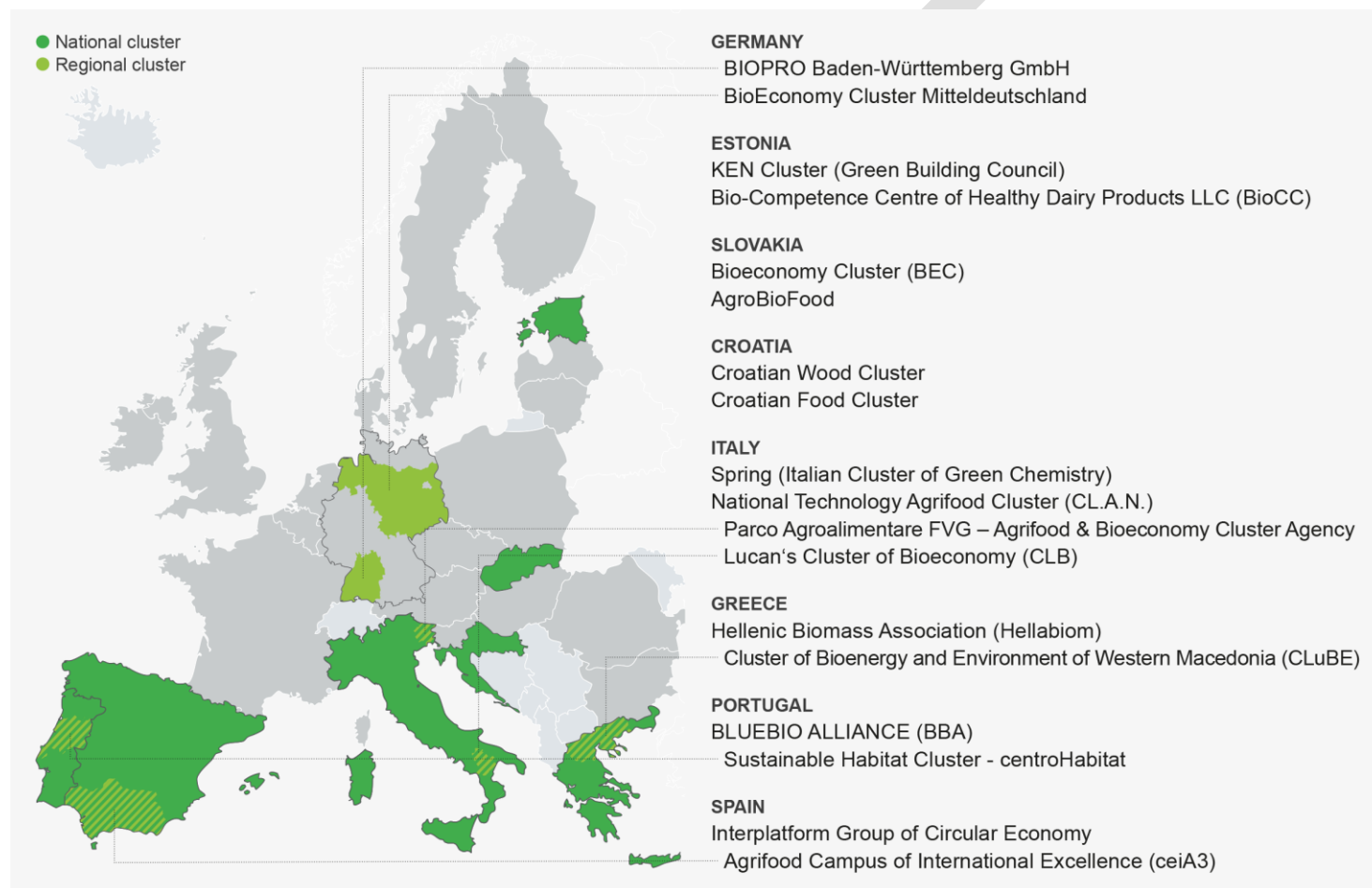


Figure 1: Map - Geographical distribution of the case studies

Note: The map shows the so-called “extended cluster region” of the Bioeconomy Cluster, Central Germany which includes the federal states Saxony-Anhalt and Saxony (core region) and Brandenburg, Berlin, Lower Saxony and Thuringia

This review is based on a desk research (literature, clusters' websites, etc.) and in-depth interviews with key representatives of the clusters (17 in total⁹). The previous work conducted under BioSTEP showed that strategies at the regional level are less easy to trace, because explicit activities, approaches, or guidelines are often lacking or are not publicly available.¹⁰

For this reason, the interviews with key stakeholders played a crucial role - the case study narratives are mainly based on the information gathered during the interviews. In order to maximise the efficiency of the interviews under this task, their objectives have been incorporated into the interviews carried out under Task 2.1 and the good practices identified by the cluster representatives from clusters beyond the Biobridges consortium (e.g. Sweden, the Netherlands) have been included in this deliverable.

In order to keep consistency and allow comparison between clusters, all clusters applied the same methodology following implementation guidelines with information about all aspects to be covered in the analysis (see Annex II).

Definition of key terms:

Clusters are network structures characterised by multiple interlinked groups or teams seeking to accomplish common organisational objectives.¹¹

"A **good practice** is not only a practice that is good, but a practice that has been proven to work well and produce good results, and is therefore recommended as a model. It is a successful experience, which has been tested and validated, in the broad sense, which has been repeated and deserves to be shared so that a greater number of people can adopt it".¹²

Key assets of a cluster: main stakeholders, biomass supply, competitive bio-based products, funding, legislation.¹³

⁹ The analysis of one of the clusters (BioPRO cluster in Germany) was only based on the desk research and literature review, no interview was conducted.

¹⁰ Overbeek G., de Bakker E., Beekman V., Davies S., Kiresiewa Z., Delbrück S., Ribeiro B., Stoyanov M., Vale M. (2016): Review of bioeconomy strategies at regional and national levels.

¹¹ Hekkert, M., S. Negro, G. Heimeriks & R. Harmsen (2011). Technological Innovation System Analysis. A manual for analysis. Universiteit Utrecht.

¹² FAO 2013: Good practices at FAO: Experience capitalization for continuous learning. External Concept Note. September 2012. URL: <http://www.fao.org/3/a-ap784e.pdf>.

¹³ BERST 2015: A representative set of case studies. Public deliverable 3.2; www.berst.eu.

4. ANALYSIS OF THE CLUSTERS

4.1. Location

Most of the clusters analysed in this report are located in Southern Europe (10 in total), with four in Western Europe and two in Northern Europe. Most of the countries surveyed have a low degree of maturity in terms of bioeconomy establishment¹⁴ or are generally classified as moderate innovators - only Germany is considered a strong innovator¹⁵.

Many of the clusters are located in the capital of the respective country but they try to expand their activities to the whole country with the help of their members (e.g. Greece's *HellaBiom* cluster).

Some of the clusters studied are located at a focus-related location: the Portuguese *BlueBio Alliance*, for instance, is located in Cascais by the sea because its members mainly deal with the blue bioeconomy. The Slovak clusters dealing mainly with food and biofuels (such as the cluster *AgroBioFood*), are located in Nitra, a city in the most fertile part of the country (Danube plain) that is also home to the Slovak University of Agriculture and the National Food and Agriculture Centre.

Other clusters have a more regional focus, such as the *BioEconomy Cluster, Central Germany*, which is limited to the states of Saxony and Saxony-Anhalt as its core and the neighbouring states (Brandenburg, Berlin, Lower Saxony and Thuringia) as an "extended cluster region". A large number of other clusters are also regionally networked and located, such as *CluBE* (Greece), *BioCC* (Estonia), or *Spring* (Italy).

4.2. Relevant biomass supply

Many clusters' main biomass supply is wood related, including Croatia's *Wood Cluster*, the clusters in Germany. Such a biomass focus, however, does not always allow conclusions to be drawn about the characteristics of the respective region. The *BioEconomy Cluster Central Germany*, for example, is located in regions where the proportion of forest area is below the national average.

A majority of the clusters analysed concentrate on agricultural products or byproducts - these include *National Technology Agrifood Cluster* in Italy, *BioCC* in Estonia. The Italian *Lucan's Cluster of Bioeconomy* focuses on food industry and thus involves cereals, fruit and vegetables, viticulture and olive oil. The *Agrifood Campus of International Excellence* in Spain also focuses on this sector.

Biomass sources from the Blue Bioeconomy are comparatively rare - only the Portuguese cluster *BlueBio Alliance* explicitly focuses on this area. The cluster hardly works directly with marine bioresources, but instead supports companies that do - through advice, partnerships,

¹⁴ Spatial Foresight, SWECO, ÖIR, t33, Nordregio, Berman Group, Infyde (2017): Bioeconomy development in EU regions-Mapping of EU Member States'/regions' Research and Innovation plans & Strategies for Smart Specialisation (RIS3) on Bioeconomy for 2014-2020.

¹⁵ EU Scoreboard (2018): European Innovation Scoreboard, <https://ec.europa.eu/growth/sites/growth/files/infographic-innovation-scoreboard-2018-map-full-size.png>

incubator services, etc. the marine biomass in question from e.g. marine fisheries, mangroves, coral reefs, and sea grass.

Residual materials are mentioned as biomass sources in some clusters (e.g. *HellaBiom* in Greece), but never as primary sources.

4.3. Relevant bioeconomy sector(s)

Which sector of the bioeconomy is most relevant to the cluster depends on which biomass is mainly used. For the *Wood Cluster* in Croatia, where the focus is on woody biomass, most members are involved in wood processing or furniture production. The *KEN Cluster* in Estonia, on the other hand, only includes wood as a sustainable building material but its members are real estate companies, builders and architectural firms. Bioeconomy clusters which focus on woody biomass often also include the sectors bioenergy and chemistry, where wood pulping can be used for chemical processes. In addition to the energy sector (e.g. *CLuBE* in Greece), the chemical industry explicitly includes the plastics industry (e.g. *Spring* in Italy).

First generation biofuels are also relevant to many clusters, which is why the corresponding sectors bioenergy or biofuels are integrated (e.g. *Bioeconomy Cluster* in Slovakia or *Spring* in Italy). Hence, agriculture and its sectors are also included in many clusters - not only as biomass sources for biofuels, but also as basis for food production.

For example, the Italian *Lucan's Cluster of Bioeconomy* aims to promote and support a new development of agro-industry in Basilicata, focusing on the environmental and socio-economic sustainability of production processes. The Italian cluster *Parco Agroalimentare FVG* also focuses on "green" chemicals including industrial solvents and biogas.

The overview table below shows the clusters' location, the bioeconomy sector covered in the cluster, and the biomass supply.

Country	Cluster (name)	Established	Location	Main biomass supply	Bioeconomy sectors
Croatia	Croatian Wood Cluster	2012	Capital (Zagreb)	Woody biomass	Forestry
	Croatian Food Cluster	2013	Capital (Zagreb)	Agricultural & aquatic biomass	Food
Estonia	KEN Cluster (Green Building Council)	2012	Capital (Tallinn)	Woody & agricultural biomass	Construction, Bioenergy
	BioCC	2004	Non-capital city (Tartu)	Agricultural biomass	Green economy
Germany	BioEconomy Cluster Mitteldeutschland	2012	Non-capital city (Halle)	Woody & agricultural biomass (and residues)	Forestry, chemistry, Bioenergy
	BIOPRO Baden-Württemberg GmbH	2003	Non-capital city (Stuttgart)	Woody & agricultural biomass (and residues)	Chemistry
Greece	HellaBiom	1990	Capital (Athens)	Woody & agricultural biomass (and residues)	Bioenergy
	Cluster of Bioenergy and Environment of Western Macedonia (CLuBE)	~2000	Non-capital city (Kozani)	Woody & agricultural biomass (and residues)	Bioenergy
Italy	Spring (Italian Cluster of Green Chemistry)	2012	Non-capital city (Milan)	Woody & agricultural biomass	Chemistry, Bioenergy
	Lucan's Cluster of Bioeconomy (CLB)	2016	Non-capital city (Potenza)	Agricultural biomass	Biotechnology, food
	National Technology Agrifood Cluster (CL.A.N.)	~2000	Capital (Rome)	Agricultural biomass	Food
	Parco Agroalimentare FVG – Agrifood & Bioeconomy Cluster Agency	2006	Non-capital city (Colloredo di Monte Albano Udine)	Woody & agricultural biomass	Food, chemistry
Portugal	Sustainable Habitat Cluster - centroHabitat	2009	Non-capital city (Aveiro)	(Aquatic biomass), woody & agricultural biomass	Construction
	BlueBio Alliance (BBA)	2015	Non-capital city (Cascais)	Aquatic biomass	Marine economy
Slovakia	Bioeconomy Cluster (BEC)	2015	Non-capital city (Nitra)	Woody & agricultural biomass	Biofuels; food

Country	Cluster (name)	Established	Location	Main biomass supply	Bioeconomy sectors
	AgroBioFood	2016	Non-capital city (Nitra)	Woody & agricultural biomass	Food
Spain	Interplatform Group of Circular Economy	2014	n/a	Woody & agricultural biomass	Biotechnology, chemistry (in the context of a circular economy)
	Agrifood Campus of International Excellence (ceiA3)	2012	Non-capital city (Cordoba)	Woody & agricultural biomass	Food

Table 1: Main characteristics of the clusters

4.4. History of the bioeconomy clusters

All researched bioeconomic clusters were founded between 1990 and 2016. However, for the majority of these groups the characterisation/identity as a bioeconomy cluster was only established in recent years. The Italian *Lucan's Cluster of Bioeconomy*, *AgroBioFood* in Slovakia (both founded in 2016) and the Portuguese *BlueBio Alliance* (established in 2015) are the youngest clusters researched.

Lucan's Cluster of Bioeconomy was founded by various public and private institutions under the leadership of the Basilicata region, which adopted a regional strategy for the smart specialisation of research and innovation for 2014-2020, identifying five thematic areas of potential development based on the structuring of specific clusters. These include the Bioeconomy Cluster, which covers water resource management, genetics for sustainable, precise and integrated agriculture, nutrition and health, green chemistry and non-technological innovations in the agri-food sector.

The Slovak National Platform *AgroBioFood* was founded in July 2016 by a Memorandum of Cooperation between the Slovak Agricultural University in Nitra, the National Agricultural and Food Centre, and the Association "Bioeconomy Cluster".

Other bioeconomy clusters were also established in the 2014-2020 period, such as the Spanish *Interplatform working group of circular economy*. This cluster was founded in June 2014 by several Spanish technology platforms with the aim of exploiting the innovation potential and cooperation between strategic industrial sectors in Spain, in order to achieve a circular and efficient economy in the use of resources.

Some of the clusters analysed have existed for some time, such as *HellaBiom* in Greece, which was established in the 1990s. In Estonia, the *BioCC* cluster was founded in 2004 as a cooperation among players in the dairy industry, but has expanded its scope to include the food industry at large under the bioeconomy cluster characterisation - it concentrates on the development of functional food, dietary supplements and food additives. The *BIOPRO BW* cluster in Germany was founded in 2003 as part of the federal state's future offensive to promote biotechnology.

Many of these clusters - including *HellaBiom*, *BioCC*, and the Central German *BioEconomy Cluster* - were not established as clusters, but were based on existing cluster structures in the region. The latter German case, for example, integrated the clusters "Chemistry/Plastics Central Germany", "Wood Cluster Rottleberode", the Energy and Environment Cluster in Leipzig with its network *BioEnergy* and the network around the Fraunhofer Centre for Chemical-Biotechnological Processes in Leuna.

4.4.1. Initial mission and objectives

Most clusters were established with the intention of fostering local economic growth, including job creation (e.g. in Greece or Croatia) and strengthening competitiveness (e.g. Croatia or Italy). They aim to achieve that growth through research and innovation (e.g. in Croatia or Spain) as well as through the marketing of innovations (e.g. Croatia) and investment. Many clusters used the term "sustainable and "rural" to describe the structure and location of the economy to be supported.

In order to achieve these objectives and sub-objectives, many clusters exchange experiences, information and technologies among their members (e.g. Greece, Portugal, Slovakia, Spain). Content topics include updates on legislation, technology developments and their applications, business opportunities or the promotion of entrepreneurial cooperation (e.g. Greece, Spain or Portugal). The clusters often also advocate bioeconomic strategies and topics at the political level (Estonia, Greece, Slovakia, Spain), build brands on national bioeconomic products (e.g. Estonia, Slovakia, Spain), provide training for their members (e.g. Estonia, Italy, Spain) or develop dissemination activities for the public - the latter is done in their respective countries (e.g. Estonia, Greece, Spain) or in an international context (e.g. Italy, Portugal, Spain).

4.4.2. (Inter)national strategies and cooperation

The relevance of cross-border exchange of knowledge and collaboration, especially in the field of the bioeconomy, is widely recognised.¹⁶ Some clusters are themselves part of larger clusters or associations, such as the *KEN cluster* in Estonia, which is part of the World Green Building Council. Moreover, many clusters do not only operate in an area that is influenced by international strategies, but develop such strategies themselves. These cluster strategies aim at their own internationalisation - by strengthening research cooperation or opening up new markets for their products. In order to achieve these goals, many clusters support their members' participation in international consortia (e.g. the Italian clusters CI.A.N. and Parco Agroalimentare FVG) or by participating in international projects such as EU Framework Programmes, European Territorial Cooperation Programmes, International Visegrad Fund, Structural Funds, etc. (e.g. Croatia's *Wood Cluster* or *Bioeconomy Cluster* in Slovakia). The internationalisation strategy of the *Bioeconomy Cluster* in Slovakia also sets objectives for future international cooperation. In 2015, the BioEconomy Cluster, Central Germany together with the BioBased Delta, the Netherlands, IAR, France and BioVale in UK founded the European 3BI intercluster: its goal is to support European companies to access important new markets based on renewable raw materials.¹⁷

4.5. Current situation

4.5.1. Main actors

In most bio-economic clusters, the main actors are private companies of different sizes (Slovakia, Portugal, Croatia, Germany or Italy), associations (e.g. business associations, as in the Portuguese *BlueBio Alliance* cluster or the Spanish *Interplatform working group of circular economy*), research institutions (e.g. Germany, Italy, Portugal, Spain or Slovakia), NGOs (Croatia, Italy and Portugal), government institutions and other local clusters (e.g. Croatia and Germany). The German *BIOPRO BW* cluster, for example, has approximately 1,000 members, of which 90% are small and medium-sized companies, 7% large companies and 3% universities.

The Spanish bioeconomy cluster *Agrifood Campus of International Excellence* is a special case here. Although universities are integrated into many bioeconomy clusters, it is only here that there is such a pronounced focus on academia. In this cluster, 200 research teams from the universities of Almeria, Cadiz, Huelva and Jaen are organized under the leadership of the

¹⁶ BÖR 2012: Internationalisation of Bio-Economy Research in Germany. First Recommendations by the BioEconomyCouncil. Berlin URL: http://bioekonomierat.de/fileadmin/Publikationen/Englisch/BOER_Recommendation05_internationalization.pdf, accessed on 28 February 2019.

¹⁷ <http://news.bio-based.eu/3bi-brokering-bio-based-innovation/>, accessed on 22 January 2019.

University of Cordoba. The other Spanish bioeconomy cluster, *Interplatform working group of circular economy*, also works very research-intensively, but its players come from the private sector and have a technology focus. 23 Spanish technology platforms work together in this cluster.

The *KEN cluster* in Estonia is an interesting case with regard to the integration of actors from different fields. This cluster includes developers, owners and companies from the real estate sector and a university (Tallinn Technology University), but also organisations active in the energy sector. The aim of this cooperation is to include input about all aspects of sustainable construction.

Many bioeconomy clusters also collaborate with other clusters: in Italy, *Lucan's Cluster of Bioeconomy* collaborates with the National Cluster on Green Chemistry, *SPRING* and *National Technology Agrifood Cluster* in Italy..

4.5.2. Current mission and objectives

The main objective of many clusters is to support their members in implementing R&D activities in order to produce products with higher added value and to increase exports. How this objective is pursued varies according to the location, mission and composition of the cluster's members.

The Spanish cluster *Agrifood Campus of International Excellence*, for example, is a university-driven cluster aimed at encouraging the participation of university research groups in European and international innovation projects and actions. A further objective is to meet the challenges of the agricultural and food sector through innovation, technology transfer and the promotion of the participation of agricultural and food companies in research and innovation projects.

In Germany, the Central German *BioEconomy Cluster* currently intends to expand its activities nationwide.

In general, the majority of the clusters is currently trying to identify and scale economically viable products and supply chains (e.g. Italy, Greece, Slovakia or Germany).

4.5.3. Main competitive products and stage of development

For most clusters there is no specific competitive product. Some clusters or cooperations between cluster members are too young to have developed marketable products, and for others the purpose of the cluster is research and networking focused rather than product-driven.

Some clusters that do involve general product groupings are the *Wood cluster* in Croatia (furniture, energy pellets and sawn wood products), agricultural products for the Slovak Cluster *AgroBioFood*, and *National Technology Agrifood Cluster* in Italy. The cluster *BioCC* (Estonia) markets specific products, such as applications of *Tensia* bacteria for medicinal use. Current role and importance (function) of the main actors

4.5.4. Bioeconomy R&D institutes, educational organisations, SMEs

In Germany, the *BioEconomy* cluster comprises 75 companies of different sizes as well as research and educational institutions. R&D institutes play a key role in this cluster. For example, the Fraunhofer-Gesellschaft is represented in the cluster by seven different institutes and research units. Industry and research are also the main players in the Greek cluster, which consists of 140 members from companies and researchers as well as scientists and experts.

About 25 % of *HellaBiom* members are companies involved in the production of biofuels, the planning of bioenergy projects and the production and sale of biomass heating appliances, while 75 % of the members are individuals (scientists, engineers, researchers). The members from the research area of the cluster are often responsible for innovation (e.g. the clusters in Germany, Italy or Estonia), education and integration into research projects (e.g. the *Agrifood Campus of International Excellence* in Spain).

Companies, their associations and funding agencies (innovation centres, legal firms) often operate the clusters (e.g. in Portugal, Italy, Spain). Research often plays a supportive role by sharing knowledge and enabling innovation processes. Policy makers also have a supportive role by being part of these clusters or accompanying them through actions at different levels.

4.5.5. Other actors (incl. policy makers, CSOs, brand owners, producers)

Some political actors do not only accompany the clusters or support them indirectly, but are also members. In Germany, for example, representatives of Saxony-Anhalt's Ministry of Economics, Science and Digitisation sit on the advisory board of the *BioEconomy* cluster. The involvement with CSOs in this German cluster, however, is limited to their participation in meetings and workshops. The dialogue with them is considered to be very challenging as it is difficult to find a common basis.

In Italy, the *SPRING* cluster is planning an action to involve citizens - whereby their participation is limited to awareness raising. The German *BioEconomy* cluster works with brand owners, which is seen as crucial as brand owners are perceived as trendsetters. Trademark owners are also members of other bioeconomy clusters (e.g. the *Bioeconomy Cluster* in Slovakia or *BioCC* in Estonia).

There is also a cooperation between the *BioEconomy* cluster in Germany and forest owners, as wood biomass is of significant importance for the cluster. However, there are no producers at the table of this cluster. The integration of these producers into bioeconomic value chains is a challenge due to the low prices for fossil products, as they see no need for participating. Similarly, the *BioCC* cluster in Estonia interacts with farmers to obtain the bacteria on which research is conducted and to use e.g. silos to test the effects of researched compounds, but does not include agricultural producers in its membership.

4.6. Legislative support mechanisms

4.6.1. National or regional instruments that support the development of the cluster, e.g. smart specialisation strategies

Policy makers influence clusters directly and indirectly through strategies and policies that address the respective bio-economic sectors. Sectoral strategies, e.g. for the forest sector, can directly promote or hamper countries' bio-economic activities.

The Croatian Smart Specialisation Strategy, for instance, played an important role in supporting the *Croatian Wood Cluster*. *Lucan's Cluster of Bioeconomy* is in line with the guidelines of the Smart Specialisation Strategy of the Basilicata region, which identify the emerging sector of the bioeconomy as one of the five development options, and also with Italy's overall bioeconomy strategy - the latter was officially adopted in 2017 and was in turn influenced by the development lines of the European Bioeconomy Strategy launched in 2012. In Estonia, where there is currently no bio-economic cluster, a bio-economic strategy is being developed. An intelligent specialisation strategy supports the *KEN cluster*.

In Slovakia, the Government Council for Science, Technology and Innovation approved the RIS3 Implementation Plan in 2017, which defines five areas of intelligent specialisation for its Operational Programme Research and Innovation. The topic of organic agriculture is partly reflected in the area "Healthy Food and Environment" that focuses on innovation and the competitiveness of the agricultural, food and forestry sectors. Slovak bioeconomy representatives were active members of this RIS3 working group. The cluster also contributed to the establishment of *AgroBioFood*, which was recognised by the Ministry of Education, Science, Research and Sport of the Slovak Republic as a competent partner for research and development in the field of food and biotechnology and as the official representative of the Slovak Republic to European and international initiatives and programmes.

For the German *BioEconomy Cluster*, the majority of the initiatives and projects that support the members are financed by the German government and awarded through programmes of the Federal Ministry of Education and Research. Examples include GISBERT (2016-2017), the BMBF programmes "New Products for the Bioeconomy" and "Innovation Spaces Bioeconomy", the Bioenergy Innovation Centre in Leipzig and the SILVA working group at BioEconomy e.V.

In rare cases, the government directly supports clusters, as in Croatia, where the government supports the Croatian food cluster through annual lump-sum funding of 25,000 € until 2016. In Spain, the Ministry of Science, Innovation and Universities supports the technology platforms, which are part of the Interplatform Group of Circular Economy.

4.6.2. Other policies and measures at national and regional level to support bio-based businesses and facilitate multi-stakeholder and cross-sector cooperation

Most clusters are partly or completely financed by the membership fees of their members. In addition, foundations play an important role in the financing of clusters, such as Blue Bio Value and the Blue Demo Network in Portugal. Blue Bio Value is an acceleration programme originally established by the Oceano Azul Foundation and the Calouste Gulbenkian Foundation. Among others, the Portuguese bioeconomy cluster *BlueBio Alliance* is a partner of this program, which identifies start-ups with high innovation and growth potential in the field of blue bio-economy. The acceleration programme focuses not only on national but also on international start-ups. Through the Blue Demo Network, Blue Bio Alliance provides support to these young companies operating in the blue bio sector by promoting a range of Portuguese infrastructures that promote the bio sector.

4.6.3. Funding instruments

For the *BioEconomy* cluster in Germany, funding instruments such as the European Regional Development Fund relevant. These instruments are therefore also listed in Regional Innovation Strategy of Saxony-Anhalt (one of the federal states where the cluster is active). However, in Saxony-Anhalt EU funding opportunities (e.g. European Structural and Investment Funds) are not fully used.¹⁸

Many other clusters also apply for EU funding programmes, from H2020 to ESIF funds (e.g. Portugal, Italy, Slovakia or Greece). In addition, clusters themselves are often part of initiatives that are partially financed. The Slovak *Bioeconomy Cluster*, for example, is part of the

¹⁸ Charles, D., Davies, S., Miller, S., Clement, K., Overbeek, G., Hoes, A.-C., Hasenheit, M., Kiresiewa, Z., Kah, S., Bianchini, C. (2016): Case studies of regional bioeconomy strategies across Europe.

BIOEAST initiative and participates in the annual forums of the EU Danube Strategy Process, whose financing instrument is the Interreg Danube Transnational Programme. The German *BIOPRO BW* cluster coordinates another Interreg project, *DanuBioValNet*, which aims to develop a Joint Bio-based Industry Cluster Policy Strategy for the Danube Region. However, its Slovak partner is Prounion, not the *Bioeconomy Cluster*.

4.7. Good governance

4.7.1. Integration of civil society actors and consumer representatives into strategy development.

As BioSTEP has shown¹⁹, bio-based transitions can be facilitated by going beyond cluster-specific triple helix relationships and involving civil society, non-governmental organisations, customers/consumers, and citizens. The majority of clusters are organised as non-profit legal entities, often run by a council (such as the *Agrifood Campus of International Excellence* in Spain). Therefore, there is often no strong hierarchy and members are encouraged to get involved. However, potential members are often limited to mainly companies and research, sometimes including policy makers. Consumers and civil society networks are not involved in the clusters' activities at all. Many clusters seek to involve consumer and/or civil society groups, but cannot because such groups do not exist in an organised form in their region or do not deal with the relevant part of the bioeconomy. Many clusters see dissemination of research results and/or product information as inclusion of consumers and civil society, since providing information to the public and consumers is a form of interaction with them. Particularly clusters with strong academic membership (participation of research institutions and universities) emphasise this type of interaction.

4.8. Cluster's mission towards sustainability

4.8.1. Are sustainability aspects considered in the cluster's strategy?

Most clusters deal with sustainability aspects, but not very concretely. It is not possible to estimate the environmental outcomes of the clusters activities.

All the clusters consider the use of biomass generally as an environmentally friendly measure, to the extent that they replace fossil feedstocks. Substitution of fossil fuels is, for example, a criterion for the Portuguese cluster *BluBio Alliance* in selecting start-ups. It is not limited to the material use of biomass. The Greek cluster *HellaBiom* also regards the inclusion of biomass in thermal energy generation or power generation as sustainable.

Only a few clusters have additional criteria or approaches for ecological sustainability. In the Croatian *Wood cluster*, sustainability issues are addressed by promoting the cascade use approach. Members of the Croatian food sector, for example, concentrate on environmentally friendly food and beverage production and questions of global warming. Its members strive to incorporate the principles of circular bioeconomy into their business models, e.g. by reusing their waste.

In general, sustainability in clusters is very much focused on their economic dimension and less on their social and environmental dimensions.

¹⁹ Davies, S., Ribeiro, B., et al. (2016): Good practice guidelines for stakeholder and citizen participation in bioeconomy strategies. Ecologic Institute, Berlin.

4.8.2. Is the focus of sustainability placed at the regional level or at the international level (e.g. “Not in my Backyard” issues vs. impacts of biomass production in developing countries)?

For most clusters, the focus is on nationally produced biomass and the corresponding positive effects of economic activity. In principle, an increase in demand for biomass can trigger increases imports of biomass from developing countries - this connection is not considered by the clusters analysed here, nor are possible negative environmental consequences of intensified domestic biomass production.

In Germany, national and international integration plays a concrete role for both clusters, even if their focus is on the regional level. For example, the BioEconomy Cluster is organising the International Bioeconomy Conference, whose partner region will be South America in 2019.

5. SYNTHESIS

5.1. Existing challenges

In several countries, the clusters are not embedded in a bioeconomy strategy, as there are simply none (e.g. Croatia or Slovakia). This lack of legislative support mechanisms poses a major risk to bioeconomically motivated initiatives (as in Greece).

Often there is also no support outside the dedicated bioeconomic sectors for bioeconomic activities (such as in Slovakia). For this reason the link between the bioeconomy of a country and other industries (e.g. chemical production, automotive industry etc.) is often missing. In addition, the supply of raw materials and skilled workers is perceived as a bottleneck for business development (Greek cluster *HellaBiom*).

For the clusters themselves, the limited capacities of their members, e.g. the company size, are sometimes perceived as a limiting factor (as is the case for both clusters in Portugal). The Portuguese *BlueBio Alliance* in particular criticises the lack of players at the end of the value chain, such as large consumer goods companies. The problem is that these actors go beyond the blue bioeconomy and often do not see the added value of the bioeconomy.

Many clusters find the lack of entrepreneurial culture a barrier to the success of their activities, especially if those involve developing new business areas (*Lucan's Cluster of Bioeconomy*). The Portuguese cluster *BluBio Alliance* also stressed the importance of strong communication and dissemination of scientific results. The Slovak *Bioeconomy Cluster* is hindered by a lack of international visibility of the activities of the cluster and lack of a "brand" at the international level.

Furthermore, many countries lack a multi-actor approach to bioeconomic activities (e.g. Croatia), funding opportunities (e.g. the clusters Croatia, Greece or Estonia) and investments (German *BioEconomy Cluster*, both clusters in Spain). Another challenge is consumer price sensitivity (e.g. *KEN clusters* in Estonia, both clusters in Spain) or lack of consumer awareness (e.g. Italy or both clusters in Spain). Low prices for fossil products (Germany) and high costs for biomass production and processing (e.g. Greece cluster *HellaBiom* or both clusters in Spain) render initiatives promoting bio-based alternatives relatively uncompetitive on a purely economic basis.

Many clusters criticised what they perceived as limited political support. However, none of the clusters examined presented the legal framework as a serious problem. It is rather the limited market for new products and value chains as well as the limited size and influence of cluster members that pose a challenge. The limited market results not least from small numbers of cluster members or their small size. The lack of customer awareness is also seen as a reason for the small size of many bio-economy markets. This lack of consumer awareness is partly explained by a lack of communication efforts, such as lack of R&D and seed investment, lack of financial support (from politicians and members).

Other challenges are related to weak government institutions or overall challenges faced by rural areas. For the Croatian *Food cluster*, the challenges include organisational weakness of the state administration, national debt, inadequate tax and fiscal policy, lack of specialised financial institutions, migration of the population from rural areas, and inadequate land policy.

5.2. Good practices

This subsection pulls out good practices of (incentives supporting) multi-stakeholder and cross-sector collaboration. In general, all clusters have the objective to foster collaboration between sectors and stakeholders and provide opportunities for networking and knowledge exchange. Therefore, the implementation of engagement instruments such as meetings, conferences etc. could be identified in all case studies. However, there are limited experiences of good practices and innovative instruments which go beyond these standard instruments. Besides, the good practices are mainly focused on tools for *gathering* stakeholders representing different group affiliations (research, industry, policy etc.) and less on cross-sectoral collaboration among these groups. Despite the limited number of innovative instruments for multi-stakeholder and cross-sectoral collaboration, there were still some examples which could be seen as good practice or which can lead to improved collaboration between stakeholders and sectors.

Good examples in terms of concrete outcomes of multi-stakeholder collaboration

CL.A.N. (Italy)

Through its flagship project So.Fi.A. (Sustainability of Agrifood supply chain) CL.A.N. has facilitated cooperation among institutions related to specific agrifood products and processes that are in various stages of development/commercialisation, e.g. the valorisation of dairy by-products, especially residues of ricotta cheese (scotta) and cheese whey for recovery of their bio-molecules. Cluster members conducted trials of double ultrafiltration steps followed by nanofiltration on scotta and cheese whey that separate and concentrate their proteins, lactose and peptides. The liquid intermediates obtained after ultrafiltration are used in post-processing treatment (enzymatic hydrolysis, oxidation) to turn bio-molecules into bio-active and functional substances like pre-biotics, functional peptides, lactulose and lacto-bionic acid.

Cluster Lucano di Bioeconomia (CLB, Italy)

The Valoriz.Zoo Project - "Valorisation of zootechnical wastewater, using innovative technology based on the use of the *Hermetia illucens* bioconverter insect" is funded under Measure 16.1 of the FEASR BASILICATA 2014-2020. The partnership was established by the University of Basilicata - Department of Sciences and the School of Engineering, the Regional Breeders Association of Basilicata (ARA), the Lucana Agency for Development and Innovation in Agriculture (ALSIA) and 15 Agricultural and zootechnical businesses. The project aims to

offer a method for disposal and exploitation of zootechnical and agri-food waste through the use of the saprophyga bioconverter *Hermetia illucens* for conversion into valuable bioproducts.

BioBased Delta (the Netherlands)

The Dare2Cross meeting in November 2018 in the Hague, Netherlands brought together representative from different sectors and disciplines to brainstorm bioeconomy collaboration across corporate lines. One of the added value of the event was the attempt to develop a common language between participants as different sectors use different terminology: a key challenge raised during the interviews under Task 2.1.

Cross-Sectoral Collaboration

One example for a cross-sectoral collaboration is that Nestlé and Danone joined forces with US-based startup Origin Materials to form the NaturALL Bottle Alliance, which aims to develop and launch at commercial scale a PET1 plastic bottle made from bio-based material, i.e. 100% renewable resources.²⁰

Innovative and effective engagement tools for fostering multi-stakeholder collaboration

Bioeconomy Cluster (Central Germany)

The GISBERT project aims to connect the research competencies of the *BioEconomy Cluster* with regional start-ups, to accelerate business start-ups and spin-offs in the bioeconomy field and to intensify the transfer of technology within the cluster and connect young new entrepreneurs with potential investors. The engagement instruments include matchmaking events, pitch events, and a special innovation boot camp.²¹

The Metsä Group (Finland)

The Metsä Group in Finland developed a phone application to interact with forest owners, as over half of the trade is done online without meeting people in the forest or at their homes. The group also launched a new service called 'virtual forest' through which data from drone helicopters is made available using augmented reality to show forest owners their forest plots remotely.²²

Support of start-ups with a clear vision towards sustainability

BlueBio Alliance (BBA, Portugal)

BBA is a partner in a group (the "Blue Bio Value" acceleration programme") that selects start-ups that substitute a fossil fuel or less sustainable product/application. For example, the 2018 winner of the acceleration programme, B'ZEOS, is a startup striving to replace plastic with material made of seaweed (mainly algae). The first product this group has developed is a biodegradable and edible drinking straw that contains no sugar.

BBA's role is to select the most promising startups which then have two months to work in the acceleration programme. Afterwards, BBA invites its members to meet the start-ups during

²⁰ More information could be found here: <https://www.agro-chemistry.com/articles/dare2cross-beauty-and-the-biobased/D>, accessed on 28 February 2019.

²¹ <http://en.bioeconomy.de/cluster/innovations/>, accessed on 20 February 2019.

²² More information can be found here: <https://www.youtube.com/watch?v=oBC9FzmGKKE>, accessed on 20 January 2019.

“boot camps,” with special regards to members providing legal and intellectual property consulting.

At the end of the acceleration programme, the three start-ups with the best performance receive a €15,000 voucher for supporting services for start-ups - these include access to offices or laboratories for biotech/ biochemistry/etc. as well as business incubation services.

Working groups that bring a wide range of stakeholders and facilitate exchange of knowledge and ideas

SPRING (Italy)

Eleven Italian Regions – Basilicata, Campania, Emilia Romagna, Friuli Venezia Giulia, Lombardy, Piedmont, Puglia, Sardinia, Tuscany, Umbria, Veneto and Autonomous Province of Trento – have committed themselves to supporting SPRING’s activities. They affirm compatibility of their development strategies and programming documents with the vision and goals of the cluster, as well as their will to pursue cooperation by promoting activities to sustain the development of SPRING.

Representatives of these regions are part of a permanent working group with SPRING that facilitates debate - conceived as a common platform to enable shared and coordinated positions on possible lines of action, this “round table” discusses technology innovation, interregional cooperation, development policies and strategies, as well as participation in regional or multiregional programmes co-financed at a national level and belonging to an Italian shared strategy. The group also shares tools and case studies of excellence, and organises training activities and employment incentive measures in the field of “green jobs”.

Bioeconomy Cluster Mitteldeutschland (Germany)

The working group SILVA. aims to promote an exchange between the projects and the topics within the *BioEconomy Cluster* and to foster the (confidential) exchange of ideas between industry and research. The working group is run by representatives from different research institutions and companies from the industry along the entire value chain of the *BioEconomy Cluster*.²³

Collaboration between clusters and regions at national and international level

Cluster Lucano di Bioeconomia (CLB, Italy)

The Agrotech Basilicata project was approved and funded by the Basilicata regional government. It aims to develop and transfer precision agriculture innovations companies, with particular reference to the sustainable management of inputs (irrigation, treatments, etc.). The project stems from an operational relationship between the *Lucano Cluster of the Bioeconomy* and the Aerospace Cluster of Basilicata (two regional technological clusters) and relies on a regional research network in the field of earth observation and study through an image of the phenotype of plants of absolute excellence. The project brings together 13 partners, which include research centers in Basilicata as well as seven relevant companies and producer organisations in the fruit and vegetable, wine and cereal sectors.

Bioeconomy Cluster (Slovakia)

²³ <https://www.bioeconomy.de/en/>, accessed on 28 January 2019.

The PROSPECT project under the Food and Nutrition and Research Infrastructure (FNH-RI) is a joint and unique initiative of 6 countries (the Netherlands, Denmark, Italy, Great Britain, France and Slovakia), which has the ambition to become part of the European Strategy Forum on Research Infrastructures (ESFRI). ESFRI is an advisory body of the European Commission and has developed a strategic paper "ESFRI Roadmap" covering a range of topics including food, health, environment, energy, etc.

BIOPRO Cluster (Germany)

BIOPRO BW coordinates the INTERREG project DanuBioValNet, which aims at developing of a Joint Bio-based Industry Cluster Policy Strategy (JBCS) for the Danube region and to establish cross-boarder strategic partnerships. It will develop a bundle of new methods and tools to support clusters working transnationally. The project involves 17 partners from 10 countries.

Bioeconomy Cluster (Central Germany)

In addition to its regional focus, the BioEconomy Cluster works nationwide with decision-makers in the relevant sectors and represents its members throughout Europe. In 2015, the BioEconomy Cluster Central Germany together with the BioBased Delta in the Netherlands, IAR in France and BioVale in the UK founded the European 3BI intercluster. Its goal is to support European companies to access important new markets based on renewable raw materials.²⁴

Collaboration between regions in Sweden

In order to boost regional bioeconomic development, Sweden has provided data of the Swedish regional bioeconomy all 21 Swedish regions, which will be updated annually and aggregated on a national level. Statistics are now publicly available as an interactive web tool and covers industries that are fully, or partly producing goods and services that connects to the use of biomass (plants, forestry, animals and fish). The development of the tool is result of collaboration between regions.

Public funding

BioBased Delta (the Netherlands)

A subsidy regulation by the Dutch government offers local governments and partnerships (of governments) expert support for the implementation of projects focused on greenhouse gas reduction and circular economy. The expert support can be designed in different ways: to provide specific sustainability knowledge, market consultation guidance, drawing up an assessment system, or finding partners. Municipalities can applied for it. Some information (in Dutch only) can be found here: <https://www.rvo.nl/aanmeldformulier-mvi-klimaatneutraal-en-circulair-inkopen-2018-wssl>

Bioeconomy Cluster (Central Germany)

Most of the initiatives and projects supporting the cluster members are funded by the federal government and are awarded through programmes of the Federal Ministry of Education and

²⁴ <http://news.bio-based.eu/3bi-brokering-bio-based-innovation/>, accessed on 22 January 2019.

Research (BMBF). Since 2012 this region Central Germany has received additional funding from BMBF to develop Central Germany as a focal point for bioeconomy activities.

Good Practices from BioSTEP

The analysis carried out in BioSTEP²⁵ showed a number of good practices in terms of provision of tools and instruments that support stakeholder engagement. A few examples are listed below:

Resources for designing engagement:

A Community Planning Tool²⁶ developed by Community Places Scotland. The toolkit aims to support the planning and design of stakeholder engagement. It focuses on different forms of engagement and provides guidelines around the following themes: Community Engagement, Community Planning, Working together, Outcome Approach and Achieving Alignment.

The Research for Sustainable Development programme (FONA) project is funded by Federal Ministry of Education and Research. The projects funded under the programme are based on applied work, involving cooperation between businesses, local authorities, and CSOs).

Bioeconomy Councils, Panels, Forums or Working Groups

Bioeconomy Councils, Panels, Forums or Working Groups play a key role for the uptake of the bioeconomy in some countries. These are typically triple-helix organisation but may also include non-governmental or civil society organisations.(e.g. the Finlands Bioeconomy Panel, German Bioeconomy Council, WiSo Competence Center in Saxony-Anhalt)

Hybrid organisation - e.g. an innovation centre or cluster body, involving businesses, research and policy-makers

The Industrial Biotechnology Innovation Centre (IBioIC) in Scotland (UK)supports researchers, businesses, policy-makers and NGOs to build links with others; organises events and meetings; provides advice on management, finance, marketing and business strategies; funds projects; and equipment centres.²⁷

EU-level activities

There are a number activities taking place at supranational level, which aim at facilitating collaboration of actors in the bioeconomy field. Listed below are a few initiatives, which can potentially also foster the establishment of multi-actor cooperation at national and regional level.

The EU Bioeconomy Stakeholder Panel

Set by the EU's Bioeconomy Strategy, the Panel aims to support interactions between different policy areas, sectors and stakeholders in the bioeconomy – leading to tangible actions. The members of the European Bioeconomy Stakeholders Panel have prepared a societal agenda for bioeconomy in a Manifesto that was published in November 2017 The manifesto set outs the cross-sectoral and multi-stakeholder collaboration as a guiding principle and highlights the

²⁵ Davies, S., Ribeiro, B., et al. (2016): Good practice guidelines for stakeholder and citizen participation in bioeconomy strategies. Ecologic Institute, Berlin.

²⁶ <https://www.communityplanningtoolkit.org/>, accessed on 28 February 2019.

²⁷ Charles, D., Davies, S., Miller, S., Clement, K., Overbeek, G., Hoes, A.-C., Hasenheit, M., Kiresiewa, Z., Kah, S., Bianchini, C. (2016): Case studies of regional bioeconomy strategies across Europe.

importance of such collaboration for the market pull of bio based products.²⁸ A number of regions and (clusters) are represented in the Stakeholder Panel.

The European Network for Rural Development (ENRD)

The European Network for Rural Development (ENRD) aims to improve rural development results in the EU by bringing stakeholders together. Through its sub-theme 'Mainstreaming the Bioeconomy' ENRD addresses development of sustainable bioeconomy value chains in rural areas.

The BIOEAST Initiative

The aim of BIOEAST is to improve the sustainable growth of knowledge-based agriculture, aquaculture and forestry in the bioeconomy in the CEE region. One of the main objectives of the BIOEAST initiative is to establish a multi-stakeholder network and cluster at European level to facilitate joint actions.²⁹

²⁸ https://ec.europa.eu/research/bioeconomy/pdf/european_bioeconomy_stakeholders_manifesto.pdf, accessed on 25 February 2019.

²⁹ <http://www.bioeast.eu/>, accessed on 24 February 2019.

6. MAIN CONCLUSIONS AND FRAMEWORK FOR UPCOMING BIOBRIDGES ACTIVITIES

A main objective of the Biobridges project is to discuss together with consumer representatives, industry, brand owners and further relevant stakeholders the challenges and opportunities regarding inter-sectoral and multi-stakeholder cooperation in the bioeconomy - specifically along new bio-based value chains. The case study analyses carried out in the context of the BioSTEP project already showed that the development of innovative bio-based products and processes is often hampered by a lack of cooperation among relevant actors:

*“The organisation of the industry network around new products and value chains, including the identification of new business partners, is a key challenge for entrepreneurs. This can be an obstacle for all types of companies, but especially for small and medium-sized enterprises as they often lack the required resources”*³⁰

The analysis of 18 case studies in Biobridges has shown that the formation and effective management of clusters is hampered by a number of factors, particularly in countries which are considered ‘moderate innovators’ by the European Innovation Scoreboard³¹ and most of the countries analysed have a low level of bioeconomy maturity.³²

The lack of public support can be identified as a main obstacle which needs to be overcome for a better and more effective management and performance of bioeconomy (-related) clusters. In this context, coordination and facilitation efforts by public bodies are a key instrument when it comes to bringing relevant actors together. Successful (public) facilitators often follow an intersectoral approach and are able to support technology transfer from researchers to the business sector. In addition to a public body that takes the role of a ‘matchmaker’, financial and organisational support and supportive policies are important requirements for businesses along new bio-based value chains.³³

In some of the analysed case studies where a key actor (e.g. a public agency or a research centre) embodies the above-mentioned criteria and/or a supportive regulatory environment was in place, the respective cluster is able to further develop its activities and to attract additional actors from relevant sectors.

These findings can form the basis for further discussions with relevant stakeholders. Guiding questions for the national and regional co-creation events planned under WP5 might focus on:

1. Which measures could public bodies take in order to facilitate matchmaking among actors?
2. Which aspects of the existing regulatory and policy framework can be further developed to support SMEs?

³⁰ Gerdes, H., Kiresiewa, Z. et al. (2017): BioSTEP Policy Paper: Creating Networks for the Transition to a Bio-based and Circular Economy. Ecologic Institute, Berlin.

³¹ EU Scoreboard 2018, <https://ec.europa.eu/growth/sites/growth/files/infographic-innovation-scoreboard-2018-map-full-size.png>.

³² Spatial Foresight, SWECO, ÖIR, t33, Nordregio, Berman Group, Infyde (2017): Bioeconomy development in EU regions-Mapping of EU Member States'/regions' Research and Innovation plans & Strategies for Smart Specialisation (RIS3) on Bioeconomy for 2014-2020.

³³ Gerdes, H., Kiresiewa, Z. et al. (2017): BioSTEP Policy Paper: Creating Networks for the Transition to a Bio-based and Circular Economy. Ecologic Institute, Berlin.

3. How to create new relationships between individual bioeconomy actors? How to search for common points of interest and interconnection?
4. How can the private sector and end consumers contribute to the bioeconomy?
5. How to incentivise companies to adopt new approaches?

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7. REFERENCES

- BERST 2015: A representative set of case studies. Public deliverable 3.2; www.berst.eu.
- BioEconomyCouncil 2012: Internationalisation of Bio-Economy Research in Germany. First Recommendations by the BioEconomyCouncil. Berlin URL: http://biooekonomierat.de/fileadmin/Publikationen/Englisch/BOER_Recommendation05_inter-nationalization.pdf, accessed on 28 February 2019.
- Charles, D., Davies, S., Miller, S., Clement, K., Overbeek, G., Hoes, A.-C., Hasenheit, M., Kiresiewa, Z., Kah, S., Bianchini, C. (2016): Case studies of regional bioeconomy strategies across Europe.
- Davies, S., Ribeiro, B., et al. (2016): Good practice guidelines for stakeholder and citizen participation in bioeconomy strategies. Ecologic Institute, Berlin.
- European Commission (2012): Innovating for Sustainable Growth: A Bioeconomy for Europe. Luxembourg: COM/2012/060 final.
- EU Scoreboard (2018): European Innovation Scoreboard, <https://ec.europa.eu/growth/sites/growth/files/infographic-innovation-scoreboard-2018-map-full-size.png>
- FAO 2013: Good practices at FAO: Experience capitalization for continuous learning. External Concept Note. September 2012. URL: <http://www.fao.org/3/a-ap784e.pdf>.
- Gerdes, H., Kiresiewa, Z. et al. (2017): BioSTEP Policy Paper: Creating Networks for the Transition to a Bio-based and Circular Economy. Ecologic Institute, Berlin.
- Hasenheit M., Gerdes H., Kiresiewa, Z., Beekman, V. (2016): Summary report on the social, economic and environmental impacts of the bioeconomy.
- Hekkert, M., S. Negro, G. Heimeriks & R. Harmsen (2011). Technological Innovation System Analysis. A manual for analysis. Universiteit Utrecht.
- Overbeek G., de Bakker E., Beekman V., Davies S., Kiresiewa Z., Delbrück S., Ribeiro B., Stoyanov M., Vale M. (2016): [Review of bioeconomy strategies at regional and national levels.](#)
- Spatial Foresight, SWECO, ÖIR, t33, Nordregio, Berman Group, Infyde (2017): Bioeconomy development in EU regions-Mapping of EU Member States'/regions' Research and Innovation plans & Strategies for Smart Specialisation (RIS3) on Bioeconomy for 2014-2020.

ANNEX I - Clusters' description

8. CROATIAN COMPETITIVENESS CLUSTER OF THE FOOD PROCESSING SECTOR

Author: Luka Dobroovic (Particula Group)

8.1. Description of the Cluster³⁴

The cluster was established as a platform for connecting and facilitating co-operation among various projects with a goal of improving competitiveness in the food processing industry of the Republic of Croatia. The cluster's members are distinguished business entities and institutions from the private and public sector, scientific-research community, as well as professional and business associations. The cluster aims to enhance the competitiveness of businesses, increase employment, increase competitiveness of the food-processing sector as a whole, and to achieve more balanced regional development and sustainable development overall³⁵.

8.1.1. Location

The cluster is headquartered in Zagreb, the capital city of Croatia.

8.1.2. Relevant Biomass Supply

The cluster involves biomass related to agricultural production and food production, including marine biomass.

8.1.3. Relevant Bioeconomy Sector(s)

The main sectors involved are food production and beverage production, the bio-energy and bio-chemical arena are also involved to a smaller extent with closed-loop business models.

8.1.4. History of the Platform

The cluster was founded in Zagreb in January 2013, supported by the Ministry of Entrepreneurships and Crafts of the Republic of Croatia and its Agency for Investments and Competitiveness (AIK).

8.1.5. (Inter)National Strategies and Cooperation

Members of the clusters include one of the biggest food companies in South-eastern Europe, which regularly attends global food sector conferences and events. The cluster aims to leverage experience and access of such big companies with significant export capabilities to the benefit of smaller companies.

³⁴ The information provided is based on an interview with the cluster representative, unless indicated otherwise.

³⁵ <http://www.aik-invest.hr/konkurentnost/prehrambeno-prerativacki-sektor/uvodna-rijec/>

8.2. CURRENT SITUATION

8.2.1. Main Actors

The main actors in the cluster are:

- Private sector companies
- Business clusters
- Public sector organisations (including municipalities and regions)
- Professional organisations and associations (Croatian chamber of commerce)
- Scientific research sector (public and private universities and Croatia's only public RTO ("ruđer bošković institute"))

8.2.2. Current Mission and Objectives

The mission of the Croatian cluster for competitiveness in the food processing sector for 2020 apply knowledge and innovation in high-quality production of traditional and functional foods for economic development in Croatia.

The cluster's global goal for the food-processing sector is **to stimulate economic growth and competitiveness of the food-manufacturing sector through research, technological development, innovation, new technologies and increased investment.**

The goal emphasises four priority areas³⁶:

1. Improving the business environment and strengthening the competitiveness of the food processing sector
2. Improving and diversifying production through research, technological development, innovation and technology
3. Development of human capital through the advancement of knowledge and skills
4. Branding, use of innovative design, promotion activities, and quality standards

8.2.3. Legislative Support Mechanisms

- The relevance of the Cluster has been supported by the Croatian smart specialization strategy – food and bioeconomy topic.
- The Cluster has leveraged from funding instruments, including ERDF: possible through calls for proposals.
- The Croatian government provided €25,000 annually to the cluster until 2016. No such financing is provided currently.

8.2.4. Cluster's mission towards sustainability

Are sustainability aspects considered in the cluster's strategy?

The cluster takes a holistic approach to eco-friendly food and beverage production as well as in tackling climate change. The members of the cluster are well aware of the importance of sustainable food production and implementation of circular bioeconomy principles in their business models. Vertically integrated companies with both agricultural and retail units consider this especially important and are reusing waste materials.

³⁶ <http://www.aik-invest.hr/wp-content/uploads/2013/12/1-strateske-smjernice.pdf>

Are the three dimensions of the sustainability (environmental, social and economic) equally considered? If no, which dimension is less/more important for the cluster?

All the three dimensions of the sustainability are equally considered in the sustainability strategy. The environmental dimension is relevant to Croatia's status as a new EU member state, as companies have had to introduce European Union environmental standards. The economic dimension is relevant to cluster members' use of the opportunity to turn waste materials into new products - mostly in terms of packaging and energy. The social dimension is embodied by the cluster's efforts to increase acceptance of novel bio-based or circular products among consumers through branding.

Is the focus of sustainability placed at the regional level or at the international level (e.g. "Not in my Backyard" issues vs. impacts of biomass production in developing countries)?

The focus is on the national level, as this is a new topic in a cluster policy. Sustainability has to be accepted locally where the production of food and beverages is taking place. The cluster has plans to expand its sustainability strategy to the international level through export of "sustainable" products, but this depends on potential export markets' standards and geographical position.

8.3. Synthesis: Existing challenges

What are the main problems/challenges experienced according to relevant actors (e.g. related to funding instruments, support mechanisms, policy framework conditions, network facilitation, etc.)?

The main problem in Croatia's food processing sector is a lack of cooperation within the supply chain. Other problems associated with food processing include: organisational weaknesses in government administration, market instability and illiquid markets, technological backwardness, debt, inadequate tax and fiscal policy, lack of specialised financial institutions, erosion and neglect of natural land potential, exodus of the population from rural areas, and bad land policy.

9. CROATIAN WOOD CLUSTER (CWC)

Author: Luka Dobrovic (Particula Group)

9.1. Description of the Cluster³⁷

Croatian Wood Cluster (CWC) is a group of connected companies involved in the activities in the field of forestry, wood processing, furniture production and similar activities, with the goal of creating of long-term sustainable business model for strengthening competitiveness of wood processing sector by encouraging the activities in the field of research, development of technology, applying and commercialisation of innovation and encouraging of investments.

9.1.1. Location

The Croatian Wood Cluster is headquartered in Croatia's capital city Zagreb. Cluster members hail from all over the Country.

9.1.2. Relevant Biomass Supply

The cluster focuses on all kinds of woody biomass.

9.1.3. Relevant Bioeconomy Sector(s)

Most members are from the wood processing, furniture, and bioenergy sectors.

9.1.4. History of the Bioeconomy Cluster

The Croatian Wood Cluster (CWC)³⁸ was founded in June 2012 to create sustainable business models for strengthening competitiveness of Croatia's wood processing sector by encouraging research, development of technology, commercialisation of innovation, and investment³⁹.

9.1.5. (Inter)National strategies and cooperation

The CWC has a strong interest in internationalisation due to of the significant export market for Croatian sawn wood and furniture products. Members of the CWC attend large international wood sector events and European wood sector fairs. The CWC is one of the few sectoral clusters that is very active in internationalisation support for its private company members. It is also implementing EU funded and national projects as a partner.

9.2. Current Situation

In line with Croatia's Smart Specialisation Strategy, the CWC has since 2013 attempted to promote the recognisability of Croatian wood products domestically and internationally. Having such a smart specialisation focus for the period from 2014 to 2020 is one of the prerequisites for receiving EU funds. Key goals of Croatia's Smart Specialisation Strategy include promoting economic growth and creating new jobs with a focus on scientific research. Unfortunately, this goal is not being achieved in the wood products sector, as Croatia lacks a national strategy for forestry products.

³⁷ The information provided is based on an interview with the cluster representative, unless indicated otherwise.

³⁸ <http://www.drwniklaster.hr/>

Project “Evaluation of Croatian forests in the EU climate policy and the new approach of cascading use of wood”.

Croatia is facing the challenge of how to further organise the field of forestry, as forest-based industries are an important sector in the country and the EU as a whole - not only in terms of GDP, but also in terms of employment, rural development, nature conservation and environmental protection. Forest-based industries account for 3.6% of GDP in Croatia and 7.5% of EU GDP.

An attack of spruce bark beetles in Croatia’s Gorski Kotar since 2017 poses a threat to the forest products industry: estimates suggest that this pest threatens about 30% of all that region’s forests⁴⁰.

The EU adopted in July 2018 a model of “cascading wood use” as a result of a new and multidisciplinary approach to forest management at the EU level, which seeks to extend the life cycle of wood products. This model sees wood products used several times before being converted into energy or disposed of, which is not in line with current practices in Croatia but is necessary there, given the forest loss from the bark beetle infestation.

9.2.1. Main Actors

Main actors in the cluster include:

- Private companies in the wood sector
- Associations and NGOs

9.2.2. Current Mission and Objectives

The cluster's main goal is **to help its members to implement R&D actions in their manufacturing process in order to produce products with higher added value and to increase exports.**

9.2.3. Main Competitive Products

Furniture, wood pellets, sawn wood products

9.2.4. Legislative Support Mechanisms

The relevance of CWC has been considered in the Croatia’s Smart Specialisation Strategy.

9.2.5. Cluster’s mission towards sustainability

Are sustainability aspects considered in the cluster’s strategy?

Yes, the cluster’s activities promote sustainable forest management and sustainable wood processing with the following objectives:

- create and preserve jobs and otherwise contribute to rural life;
- protect the environment by preserving soil, minimising erosion, purifying water, protecting aquifers, improving air quality, absorbing carbon, and preserving biodiversity
- monitor the state of forests to meet environmental agreements
- improve the competitiveness of forest-based industries in the internal market;

⁴⁰ <http://www.drwniklaster.hr/category/projects/in-progress/>

- promote the use of wood and other forest products as environmentally friendly products;

Are the three dimensions of the sustainability (environmental, social and economic) equally considered? If no, which dimension is less/more important for the cluster?

Yes, see above.

Is the focus of sustainability placed at the regional level or at the international level (e.g. “Not in my Backyard” issues vs. impacts of biomass production in developing countries)?

The focus of the sustainability is both national and international, since the Croatian wood sector is export oriented. However, there is no impact of biomass production in developing countries.

9.3. Synthesis: Existing Challenges

What are the main problems/challenges experienced according to relevant actors (e.g. related to funding instruments, support mechanisms, policy framework conditions, network facilitation, etc.)?

- Croatia lacks a national bioeconomy strategy
- Cluster policies are weak to non-existent in Croatia
- There is a lack of cross-sectoral support
- The approach does not involve many multidisciplinary actors
- There are not enough funding opportunities

A highly positive experience is that cluster members value the cluster as an institution and are thus financing it without any government support.

10. BioCC Research Centre

Author: Liisa Vipp (Civitta)

10.1. General information about Estonia's bio-economy

Estonia is currently developing a bio-economy strategy under the auspices of its Rural Affairs and Environment Ministries, respectively. Estonia does not yet have a bio-economy cluster. The country has great potential for biomass production, as it has twice the per capita arable land of the EU27 average - more than half of Estonia's mainland is forest.

10.2. Description of the Cluster⁴¹

Estonia's Biotechnology Competence Center (BioCC) is an internationally known and recognised competence centre for the development of functional food, food supplements and feed additives. It has put on the market internationally recognised products in these sectors. BioCC offers the food and feed processing enterprises advisory services related to the entire food chain on issues concerning feed, food, nutrients, and nutrition.⁴²

10.2.1. Location

Tartu, Estonia

10.2.2. Relevant biomass (feedstock) supply

Human and animal organisms - for isolating bacteria (mainly from infants) as well as agricultural pastureland (calves, and products for silo fermentation).

10.2.3. Relevant bioeconomy sector(s)

Food and feed additives

10.2.4. History of the centre

In 2004 the government agency Enterprise Estonia (EAS) launched a programme for technology research centres to increase the competitiveness of private sector companies through science and innovation, and to increase cooperation between universities and companies. Universities and companies applied for grants to conduct joint projects together, with 50% of the awarded funds going to businesses (private sector) and 49% to universities. Tartu University, the University of Life Sciences, and other institutes partnered with Estonian dairy products firm E-piim and two other companies - this group's project proposal became the BioCC research centre. Initially, the member organisations' laboratories were used for research, but in 2009 the cluster built its own facility.

10.2.5. Main actors (entrepreneurs, policy-makers, knowledge institutes)

When established in 2004, BioCC consisted of two universities, three private sector companies and a few other institutions. The policymakers made the initial cooperation possible, meaning the public sector constituted the main actor at the time.

10.2.6. Initial mission and objectives

The focus of the Bio-Competence Centre of Healthy Dairy Products (project EU 30002) was to enhance the dairy industry's competitiveness and profitability through innovative solutions,

⁴¹ The information provided is based on an interview with the cluster representative, unless indicated otherwise.

⁴² <https://biocc.eu/>

encompassing the whole chain (feed industry, dairy breeding and nutrition, dairy technology, human nutrition and medicine) of added-value milk and dairy products. Initial strategic development areas were

- sustainable breeding and nutritional strategies to produce specialty milk varieties and increase the profitability of milk production - this involved promoting the biotechnological properties of milk in fostering human health
- development of research-based functional dairy foods and establishment of innovative biotechnological applications/platforms for food enterprises (microbiological, biochemical and clinical approach) - this involved research into dairy foods that reduce the risk of cardiovascular diseases and recurrent inflammatory diseases

10.2.7. (Inter)national strategies and cooperation

BioCC remains in close cooperation with many universities and research institutions world-wide, and participates in several international projects with large consortia (25-30 partners per project). Figure 2 lists some of the international partners.



Figure 2: Logos of international partner institutions with Estonia's BioCC

10.3. Current situation

10.3.1. Main actors

Since its founding, several additional institutions (universities and small/medium enterprises) have become part of BioCC through various projects.

10.3.2. Current mission and objectives

The mission is the same as at the BioCC's inception, but the focus is now larger. Having started with milk products only and focusing exclusively on nutrition technology in the dairy industry, the group now produces and researches functional food for the entire food industry. The centre is currently working in the area of food waste management - a process whereby food waste is decomposed by bacteria and the new product can be used in agriculture as organic fertiliser.

10.3.3. Main competitive products and stage of development

Tensia bacteria – food supplement in cheese (also available in pill form) that lowers blood pressure and improves digestion. This product is under accelerated development.

10.3.4. Current role and importance (function) of the main actors

BioCC's membership includes entrepreneurs - large-scale industries as well as small and medium enterprises (SMEs). The primary food industry and enterprises involved are dairy firms such as E-Piim and Valio. These are also "brand owners." The Estonian Food Industry Association, a trade group for food companies, is also a member. The main public sector supportive body is Estonia's Ministry of Rural Affairs. Estonia's National Institute of Health Development, a government established R&D body, is also involved. Bioeconomy R&D institutes and educational organisations also participate, for example the Russian Academy of Medical Sciences.

10.3.5. Legislative support mechanisms

BioCC receives financial support from the Enterprise Estonia's Technology Research Centre programme as well as from various EU projects. Policies and measures at national and regional level to support bio-based businesses and facilitate multi-stakeholder and cross-sector cooperation include European Innovation Partnership clusters as well as projects with the Estonian Agricultural Register and Information Board.

Good governance

Neither consumer groups nor civil society organisations are currently involved in BioCC, but part of the group's mission is educating the public (pharmacists, family physicians and the overall food industry) about probiotics and other BioCC products, and how they can help their patients/customers.

10.3.6. Centre's mission towards sustainability

Sustainability is part of BioCC's objective - the three dimensions of sustainability (environmental, social and economic) are considered, with social and economic dimensions being most important given the focus on human health and bioeconomy practices among food producers/processors.

Is the focus of sustainability placed at the regional level or at the international level (e.g. "Not in my Backyard" issues vs. impacts of biomass production in developing countries)?

As the products resulting from BioCC's activities (e.g. bacteria to enhance silo storage, food supplements with positive human health effect), are applicable globally, the focus of sustainability can be called international. The products are also sold abroad..

10.4. Synthesis: existing challenges

What are the main problems/challenges experienced according to relevant actors (e.g. related to funding instruments, support mechanisms, policy framework conditions, network facilitation, etc.)?

The legislative process regarding human food and probiotics is complex and not well-defined, hampering research and entrepreneurship in this area. For instance, regulatory processes at the European level on probiotics development are delayed, impacting the work of the BioCC.

11. KEN Cluster (Green Building Council), Estonia

11.1. Description of the Cluster⁴³

The cluster unites developers, owners and companies in Estonia's real estate and energy sectors, who provide services across the whole sustainable building cycle. The cluster's members are involved in actions and processes across the building value chain, from planning and architectural concepts to construction, management, maintenance, sales and marketing. Members also provide financial and legal advice as well as other related services.

The cluster is legally recognised as a non-profit organisation. It has 18 member companies and organisations, and is looking for new members.

11.1.1. Location

Estonia

11.1.2. Relevant biomass supply

The construction and energy sector obtains biomass from multiple sectors, especially energy crop residues and other types of waste.

11.1.3. Relevant bio-economy sector(s)

Renewable energy, sustainable construction

11.1.4. History of the bio-economy cluster

- When established and the main actors (entrepreneurs, policy-makers, knowledge institutes)?

The KEN cluster was established in 2012 by actors in the private sector (entrepreneurs), together with universities (education) and government ministries for economy, environment and finance.

11.1.5. Initial mission and objectives

The mission is to develop new business opportunities for its members in the sustainable real estate and energy sectors, domestically and abroad. Ways of achieving this mission include:

- offer combined services and products across the full lifecycle and thus fulfil the market need
- build a leading Estonian brand around sustainable real estate and energy
- create Smart.Connect - a marketing tool to enhance sales, brand and alliances for members
- create Built.IT.Smart - a database for developing an improved internal environment in buildings
- improve laws, standards, regulations in the the domestic real estate market for effective positioning vis-à-vis international competitorsconduct trainings and seminars, compile information booklets/documents , participate in different projects

⁴³ The information provided is based on an interview with the cluster representative, unless indicated otherwise.

11.1.6. (Inter)national strategies and cooperation

KEN cluster members cooperate with sister companies in other countries.

11.2. Current situation

11.2.1. Main actors

- Non-profit organisation: Green Building Council, the lead partner of the cluster
- Companies: SWECO EST, Hendrikson&Ko, 3+1 Arhitektid, Saint-Gobain Ehitustooted, Natuurehitus, Vesta Green House, Ravelin, Oxford Sustainable, Pärnu Commerce, Sirkel & Mall, Maru Ehitus, GECC, Advokaadibüroo Sorainen, Technopolis Ülemiste, Pakri Teadus- ja Tööstuspark
- University or research institution: Tallinn Technology University
- Public authorities: Juuru Rural Municipality

11.2.2. Current mission and objectives

KEN's mission is the same as at its inception, only it has increased to an international scale since KEN is part of the World Green Building Council (World GBC), which is active in over 90 countries globally. It is the leading global organisation driving positive and sustainable change in renewable energy, sustainable real estate development, construction, planning, design and operation. GBCs in Scandinavia as well as in Central and Western Europe give members the chance to be a part of a regional grouping to share knowledge with and promote their products and services to members in other countries at low cost.

11.2.3. Main competitive products and stage of development

Different biomass products used in buildings

11.2.4. Current role and importance (function) of the main actors

KEN cluster has 14 companies, including large-scale industries and small and medium enterprises. Some of these, such as Saint Gobain, can be considered "brand owners". It cooperates with various government ministries and also with municipalities. Bio-economy R&D institutes and educational organisations involved include Tallinn University of Technology and University of Life Sciences. Biomass producers that are member organisations include Estonian State Forests (RMK) as well as the company Oxford sustainable Fuels.

11.2.5. Legislative support mechanisms

KEN receives support from the Smart Specialisation Strategy initiatives, but there are not many of these in Estonia. There are no other national or regional level policies for supporting bio-based businesses.

With regard to KEN's support of relevant legislation, the cluster has a special focus on laws and regulations in the green building sector, monitoring activities of ministries and making suggestions to improve the current legislation. The cluster also acts as a platform for entrepreneurs vis-a-vis the government to voice the needs of the sector.

11.2.6. (Inter)National strategies and cooperation

Estonia's bio-economy strategy is still under development, but the country's National Strategy on Sustainable Development, "Sustainable Estonia 21", covers many relevant areas in the following ways:

- use of natural resources in the manner and volume ensuring ecological balance
- minimising pollution
- conservation of biodiversity and natural areas

11.2.7. Good governance

As consumer and civil society groups do not exist in the form of established organisations and networks in Estonia, they are not able to be members of KEN. Some groups related to sustainable development are the non-governmental organisation Estonian Fund for Nature and the Ecological Agriculture Foundation (Maheklubi).

KEN Cluster's strategy requires each partner organisation to spend at least 50 hours per year raising public awareness about sustainable building issues to effect consumer behavioural change. The strategy also states that cluster members will devote 200 hours per year to projects at universities.

11.2.8. Cluster's mission towards sustainability

Is the focus of sustainability placed at the regional level or at the international level (e.g. "Not in my Backyard" issues vs. impacts of biomass production in developing countries)?

Both

11.3. Synthesis: existing challenges

What are the main problems/challenges experienced according to relevant actors (e.g. related to funding instruments, support mechanisms, policy framework conditions, network facilitation, etc.)?

Obtaining funding for the cluster's initiatives poses a challenge, as the circular economy is not a priority of Estonian politicians - there are few financing opportunities for bioeconomy activities. Another challenge is that while the general population supports bioeconomy concepts in principle, consumer decisions are still based on price, such that sustainable products and practices tend to fail if they are more expensive than conventional ones. Greater public awareness of the need for sustainable development would foster and improve cooperation among KEN's member organisations.

Sources:

- [1] https://www.scar-swg-sbgb.eu/lw_resource/datapool/items/item_24/survey_bioeconomy_report1501_full_text.pdf
- [2] <https://www.estonianclusters.ee/>
- [3] <http://www.kencluster.com/ken-cluster.html>
- [4] http://www.gbc.ee/gbc_eng.html

12. BIOECONOMY CLUSTER, CENTRAL GERMANY⁴⁴

Authors: Zoritza Kiresiewa and Holger Gerdes (Ecologic)

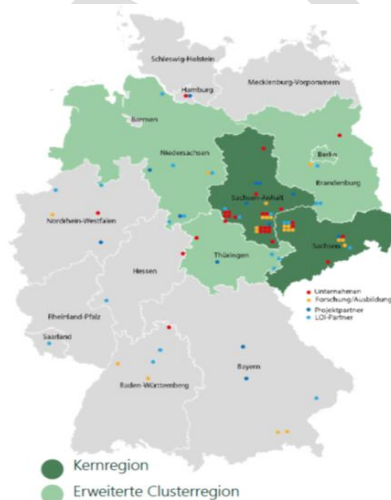
12.1. Description of the Cluster⁴⁵

The BioEconomy Cluster is a network of companies, research institutes and educational institutions that work closely linked to the foundations of a bio-based economy. Based on non-nutritionally renewable raw materials, e.g. Beechwood, the material and energetic use of biomass in the form of innovative processes for the production of materials, chemicals, products and energy sources is to be driven forward. On the scale of an entire competence region - the cluster region Central Germany - value chains will continue to be expanded and optimized sustainably and efficiently through co-production and cascading use of the residues.

12.1.1. Location

The regions forming the core of the cluster are located in the federal states Saxony and Saxony-Anhalt (coloured in dark green on the map below). The neighbouring federal states Brandenburg, Berlin, Lower Saxony and Thuringia are part of the so-called “extended cluster region” (coloured in light green).

Figure 3: Location of the Bioeconomy Cluster, Central Germany⁴⁶



Source: Bioeconomy Cluster Central Germany, 2018

12.1.2. Relevant Biomass Supply

The cluster's activities build on wood biomass, which can be considered an abundant resource in the cluster region. However, the proportion of forested area in these regions is slightly below the German average (32%), with 28% in Saxony and 24% in Saxony-Anhalt (Stiftung Unternehmen Wald, 2014)⁴⁷.

⁴⁴ The information provided is based on an interview with the cluster representative, unless indicated otherwise.

⁴⁵ <https://www.bioeconomy.de/en/>

⁴⁶ <https://docplayer.org/11035066-Clusterarbeit-kooperation-mit-nachhaltigkeit.html>, accessed on 7 November 2018

⁴⁷ <https://www.wald.de/bundeswaldinventur-der-wald-in-zahlen/>, accessed on 24 January 2019.

12.1.3. Relevant Bioeconomy Sector(s)

While the forestry sector serves as the main biomass provider, further sectors play a key role in the cluster's activities, particularly the plastics industry, the chemical industry, and the energy sector.

12.1.4. History of the Bioeconomy Cluster

The cluster was officially established in October 2012 and builds upon pre-existing cluster structures in the region. It integrates the cluster "Chemistry/Plastics Central Germany", the Wood Cluster "Rottleberode", the Energy and Environment Cluster in Leipzig with its network BioEnergy, and the network surrounding the Fraunhofer Centre for Chemical-Biotechnological Processes (CBP) in Leuna. Added to this are various branches of the chemical industry, the plastics and plastic processing industry, the paper and pulp industry, machine and plant engineering for processing industries, and renowned research institutions from related sectors⁴⁸.

In 2012, the cluster was one of the winners of the 'Top Cluster Competition' of the Federal Ministry of Education and Research (BMBF).

12.1.5. Main Actors

The cluster is composed by a network of companies (including large companies and SMEs), research institutes, Universities and educational institutions.

12.1.6. Initial Mission and Objectives

The strategic objectives of the cluster are:

- "To sustainably maximise value creation of non-food biomass through coupled production and cascade utilisation in order to generate chemicals, new materials and energy."
- "To speed up innovation through the integrated, temporally and spatially coordinated up-scaling of processes and plants from laboratory to development demonstration scale."⁴⁹

12.1.7. (Inter)National Strategies and Cooperation

The cluster is involved in the implementation of the Regional Innovation Strategy for Saxony-Anhalt and is in charge of one of the five leading markets identified in the strategy, namely the leading market "Chemistry and Bioeconomy".

In addition to its regional focus, the BioEconomy Cluster works nationwide with decision-makers in the relevant sectors and represents its members throughout Europe. In 2015, the BioEconomy Cluster Central Germany together with the BioBased Delta in the Netherlands, IAR in France and BioVale in the UK founded the European 3BI intercluster. Its goal is to support European companies to access important new markets based on renewable raw materials⁵⁰.

⁴⁸ <https://www.region-halle.de/de/cluster-bioeconomy/cluster-bioeconomy.html>, accessed on 23 January 2019.

⁴⁹ <http://en.bioeconomy.de/strategic-objectives/>, accessed on 23 January 2019.

⁵⁰ <http://news.bio-based.eu/3bi-brokering-bio-based-innovation/>, accessed on 22 January 2019.

12.2. Current Situation

In total, 75 companies and research organisations are members of the cluster. Key actors are:

- The Wood Cluster “Rottleberode” provides the crucial technological competency needed to supply and process wood as a raw material and to mechanically recycle it.
- The companies at the chemical site in Leuna and the Fraunhofer partners IAP, PAZ and IWMH are engaged in the further processing of basic chemicals. The competency for energy recovery of residual waste streams is covered by DBFZ Leipzig and other partners from the BioEnergy Network Leipzig. Material flows are monitored by UFZ Leipzig⁵¹.

12.2.1. Current Mission and Objectives

The cluster is planning to expand its activities nationwide.

12.2.2. Main competitive products and stage of development

The value chains are just being developed; there are no concrete examples of innovative and competitive bio-based products so far.

12.2.3. Current role and importance (Function) of the main actors

- Entrepreneurs, including large-scale industries and small and medium enterprises

More than 75 companies, research institutes and educational institutions are organised in the BioEconomy Cluster⁵². Currently, 44 joint projects are underway with approximately 144 subprojects.

- Bioeconomy R&D institutes and educational organisations

Bioeconomy R&D institutes play a key role in the cluster. For instance, Germany's Fraunhofer Society is represented in the cluster with seven different institutes and research units.

- Policy-makers and supportive bodies

Representatives of the Ministry of Economy, Science and Digitalisation of Saxony-Anhalt are members of the Cluster's Advisory Board.

- Consumers and civil society networks

The engagement with CSOs is limited to meetings, workshops and working groups where the latter are invited to participate. The dialogue with them is “very challenging and it is difficult to find a common ground”, according to the cluster representative.

- Brand owners

The clusters collaborate with brand owners. This is crucial as “brand owners are trendsetters”, according to the cluster representative.

- Biomass producers, including associations

⁵¹ <http://en.bioeconomy.de/kernkompetenzen/>, accessed on 23 January 2019.

⁵² <http://en.bioeconomy.de/cluster/>, accessed on 22 January

The cluster collaborates with some forest owners due to the importance of wood biomass in the region.

If some of the main actors are absent, why is that? Are there difficulties of involving certain actors?

At this stage, the producers are barely involved despite their relevance. Involving producers in bioeconomy-related value chains is challenging due to the low price of fossil-based products. There is a need to rethink existing value chains.

12.2.4. Legislative Support Mechanisms

National or regional instruments that support the development of the cluster, e.g. smart specialisation strategies

Most of the initiatives and projects supporting the cluster members are funded by the federal government and are awarded through programmes of the Federal Ministry for Education and Research (BMBF). Some examples are listed below:

- The GISBERT project (2016-2017) connected the research competencies of the BioEconomy Cluster with regional start-up support provided in Central Germany to accelerate business start-ups and spin-offs in bioeconomic fields of innovation. It aimed to intensify the transfer of technology within the cluster and connect young new entrepreneurs with potential investors. Specific formats included matchmaking events, with mottos like “Business Meets Science” and “Design Meets Bioeconomy”, pitch events, and a special innovation boot camp.
- BMBF programme “New Products for the Bioeconomy” and “Innovation Spaces Bioeconomy” (German: Innovationsräume Bioökonomie)
- The Bioenergy Innovation Centre in Leipzig has been operating since 2013 with the aim of accelerating innovation processes; it offers customised services and procures excellent research infrastructure specifically designed for small and medium-sized companies (SMEs).
- The working group SILVA within BioEconomy e. V. aims to promote an exchange between projects and topics within the BioEconomy Cluster. Members include representatives from different research institutions and companies from the industry along the entire value chain of the BioEconomy Cluster. The working group organises meetings and aims to establish room for the confidential exchange of interests and ideas between industry and research.
- The cluster gets financial support from the Ministry of Economy, Science and Digitalisation of Saxony-Anhalt for the facilitation of regional and supra-regional cooperation between companies and business institutions (2,000,000 € for the period from 2017 to 2026)⁵³.

Funding instruments, including ERDF

Funding instruments, including ERDF are listed in the Regional Innovation Strategy of Saxony-Anhalt. But EU funds (such as European Structural and Investment Funds) are not used to an appropriate extent in Saxony-Anhalt) (Charles et al., 2016).

12.2.5. Good Governance

Involvement of consumers and consumer associations (public participation)

Consumers and consumer associations are not directly involved in the cluster's activities.

Involvement of civil society organisations (public participation)

Partly, as described above.

12.2.6. Cluster's mission towards sustainability

Are sustainability aspects considered in the cluster's strategy?

Yes, according to the cluster representative.

Are the three dimensions of sustainability (environmental, social and economic) equally considered? If no, which dimension is less/more important for the cluster?

Yes - this is envisaged, according to the cluster representative.

Is the focus of sustainability placed at the regional level or at the international level (e.g. "Not in my Backyard" issues vs. impacts of biomass production in developing countries)?

The focus is placed at the regional level, but the national and international dimensions play a role. For example, the cluster organises an International Bioeconomy Conference whose partner region in 2019 will be South America.

12.3. Synthesis: Existing Challenges

What are the main problems/challenges experienced according to relevant actors (e.g. related to funding instruments, support mechanisms, policy framework conditions, network facilitation, etc.)?

- Involving producers in bioeconomy-related value chains is challenging due to the low price of fossil-based products.
- The supply of raw materials is a constant bottleneck.
- Availability of specialists.
- Product development and innovation culture.
- Economically limited investment opportunities.⁵⁴

Recommendations for further development:

- There is a need for innovative forms and methods of cross-sector, supra-regional cooperation and networking of all actors in the forest-wood value chain.
- The involvement of partners and institutions from other sectors is a key success factor (ibid.).

⁵⁴ <https://docplayer.org/11035066-Clusterarbeit-kooperation-mit-nachhaltigkeit.html>, accessed on 23 January 2019.

13. CLUSTER INITIATIVE “BIOPRO BADEN-WÜRTTEMBERG GMBH”

Author: Holger Gerdes (Ecologic)

13.1. Description of the Cluster

BIOPRO Baden-Württemberg GmbH (BIOPRO BW)⁵⁵ is a service agency and cluster initiative owned by the state of Baden-Württemberg. It focuses on the following sectors: bioeconomy, biotechnology, pharmaceutical industry and medical technology (healthcare industry). One of BIOPRO BW's core objectives is to communicate these sectors and related activities to relevant stakeholders and the general public. BIOPRO BW serves as a main contact point for stakeholders, aiming to facilitate cooperation among relevant actors.

13.1.1. Location.

Located in the southwest of Germany, the cluster initiative BIOPRO BW covers the healthcare and bioeconomy industries of the federal state of Baden-Württemberg.

13.1.2. Relevant biomass supply

The cluster's activities in the areas of biotechnology, pharmaceutical industry and medical technology do not employ biomass feedstocks. With regard to the more general bioeconomy area, by-products and residues from forestry and agricultural activities are considered an important feedstock (Möndel & Jonischkeit, 2017).

13.1.3. Relevant bioeconomy sector(s)

While, in general, the cluster initiative addresses the bioeconomy, the specific sectors covered by BIOPRO BW are biotechnology, pharmaceutical industry and medical technology. These three sectors are jointly addressed under the heading 'healthcare industry'. BIOPRO BW also coordinates the biopolymers/biomaterials cluster, which was established in 2007 and encompasses disciplines such as biotechnology, chemical engineering, polymer chemistry and plastics technology.

13.1.4. History of the bioeconomy cluster

BIOPRO BW was founded in 2003 as part of the states government's 'Zukunftsoffensive' programme. In 2006, the biopolymers/biomaterials cluster won the 'BioIndustry 2021' competition of the Federal Ministry of Education and Research (BMBF). Being responsible for its coordination, the biopolymers/biomaterials cluster forms the core of BIOPRO BW's bioeconomy activities.

13.1.5. (Inter)national strategies and cooperation

BIOPRO BW serves as an international contact point for transnational collaboration in the bioeconomy area. As a key activity in this field, BIOPRO BW coordinates the INTERREG project DanuBioValNet, a cross-clustering partnership for boosting eco-innovation by developing a joint bio-based value-added network for the Danube Region. Specifically, DanuBioValNet aims at developing a so-called 'Joint Bio-based Industry Cluster Policy

⁵⁵ <https://www.bio-pro.de/en/>

Strategy' (JBSCS) for the Danube region (Meier zu Köcker et al., 2017). The project involves 17 partners from 10 countries.

13.2. Current situation

13.2.1. Main actors

BIOPRO BW has approx. 1,000 members, of which 90% are small and medium-sized companies, 7% are large corporations, and 3% are universities. The biopolymers/biomaterials cluster consists of 150 companies and 40 research organisations.

13.2.2. Current mission and objectives

BIOPRO BW's mission as described on its website has four main objectives:

- work in partnership with science, the economic sector and business and science networks
- contribute to cross-sectoral cooperation across the entire value creation chain and thereby foster innovation;
- offer support for technology transfer and start-up projects
- provide relevant actors with comprehensive information

Since 2014, BIOPRO BW is officially responsible for the establishment of the bioeconomy in Baden-Württemberg.

13.2.3. Main competitive products and stage of development

The publication *Bioökonomie in Baden-Württemberg – Wertschöpfung mit Zukunft* (Möndel & Jonischkeit, 2017) lists a number of bio-based products currently being explored - these include yarn, wood-based chemicals, insulation materials, and bio-based packing solutions.

13.2.4. Current role and importance (function) of the main actors

- Entrepreneurs, including large-scale industries and small and medium enterprises

A database search on BIOPRO BW's website results in 1,060 biotech, medtech and pharma companies active in the Baden-Württemberg healthcare sector.

- Policy-makers and supportive bodies

BIOPRO BW is a state-owned agency; the federal state of Baden-Württemberg is therefore the main policy actor and supportive body.

- Bioeconomy R&D institutes and educational organizations

A database search on BIOPRO BW's website results in 44 research institutions active in the Baden-Württemberg bioeconomy sector.

13.2.5. Legislative support mechanisms

- Policies and measures at national and regional level to support bio-based businesses and facilitate multi-stakeholder and cross-sector cooperation
- State government of Baden-Württemberg

The biopolymers/biomaterials cluster was one of five winners of the BioIndustry 2021 competition run by the German Federal Ministry of Education and Research (BMBF) in 2006.

Between 2007 and 2012, the BMBF provided funding totalling €10 million for the implementation of the cluster.

13.2.6. Good governance

Consumers and civil society networks are not involved in the cluster. According to an assessment undertaken by the FP7 project BERST, BIOPRO BW's activities do not foster effective governance and involvement of society.

Sources:

BERST project (no date): BERST - Catalogue of Instruments & Measures. Factsheet: Bio-Pro. Available online at <https://berst.vito.be/node/41>

BIOPRO BW: History and achievements. Available online at <https://www.bio-pro.de/en/biopros/history/>

BIOPRO BW: Our mission: Pooling competencies – pushing innovations. Available online at <https://www.bio-pro.de/en/biopros/mission/>

Meier zu Köcke, G. (2017): BBCEI - The BioBased Cluster Excellence Initiative. DanuBioValNe project.

Möndel, A. & Jonischkeit, B. (2017): Bioökonomie in Baden-Württemberg – Wertschöpfung mit Zukunft. Pressestelle Ministerium für Ländlichen Raum und Verbraucherschutz Baden-Württemberg, Stuttgart.

14. HELLENIC BIOMASS ASSOCIATION (HELLABIOM)

Author: Eleni Karachaliou (QPLAN International)

14.1. Description of the Cluster

The Hellenic Biomass Association (HellaBiom)⁵⁶ is a non-profit organisation and one of the principle national associations in the sector of renewable energy sources since the 1990s⁵⁷.

Despite having its headquarters in Athens, HellaBiom is active throughout the whole country with members everywhere in Greece.

Due to the association's panhellenic nature, enumerating all the individual biomass suppliers would be redundant. The majority of HellaBiom's members are biomass suppliers, firms that produce or involve forest biomass and agricultural residues used for bioenergy.

14.1.1. Current Mission and Main Actors

Hellabiom emerged in the early 1990's as the first Greek association in the field of renewable energy in general and biomass in particular. The cluster's mission is to support the efficient and sustainable use of biomass for energy purposes and other applications, contributing to the creation of new job opportunities in the field of bioeconomy, the gradual elimination of fossil fuels, and the mitigation of climate change. The cluster consists of 140 members from business to research to individual professionals working in the field of biomass exploitation and bioenergy on both a local and a national level.

About 25% of HellaBiom members are companies involved in biofuel production, engineering of bioenergy projects and manufacture and sales of biomass heating appliances. About 75% of members are individuals (scientists, engineers, researchers) who share a common interest in the sustainable development of biomass in Greece⁵⁸.

The cluster's current activities focus on exchanging experience, information and technology along with immediate scientific and professional connections among stakeholders within the fields and the market of bio-based products, biofuels, and bioenergy. These exchanges take the form of:

- updates on legislation, technology applications, business opportunities and entrepreneurial collaborations on local, national and pan-European level
- participation at conferences, seminars, exhibitions and trade shows
- cluster representation at public consultations regarding relevant legislation, participation in focus groups held by ministries and scientific entities and data collection for statistical analysis
- sharing of experiences with bioenergy, including solid biomass for thermal production and electrical generation, biofuels for transportation, biogas, management of biomass residues, supply chains for raw material and end products, and the circular economy in general

⁵⁶ Information based on the association's official website and an interview with a representative of the association.

⁵⁷ <http://hellabiom.gr>

⁵⁸ <http://hellabiom.gr/?lang=en>

- shared access to selected information, statistics and communication material for bioenergy

At the international level, HellaBiom is an active member and holds strong collaboration with its European counterpart BIOENERGY EUROPE (AEBIOM).

14.1.2. Current Role and Importance of the Main Actors

All the members of HellaBiom play equally important roles. In particular, they actively support the successful implementation of all the activities of the cluster, which aim to exploit biomass and bioenergy production, as well as to collectively address contextual issues related to the field.

14.1.3. Legislative Support Mechanisms

Greece has no national/regional instruments or smart specialisation strategies that support the development of the association.

The only existing support mechanisms that cluster members can benefit from are specific funding instruments such as H2020, and Interreg, as well as sectoral and operational programmes under the umbrella of the Partnership Agreement for the Development Framework 2014-2020. The cluster is also financed by a membership fee, but its levels must remain very low due to the effects of the financial crisis.

14.1.4. Cluster's Mission towards Sustainability

All three dimensions of sustainability (society, environment, economy) are equally considered within the cluster's strategy. Through the services it provides, the association aims to meaningfully contribute to and further use biomass in the context of reform of the national energy framework - either autonomously or in collaboration with other renewable energies - both in thermal energy production and electricity generation.

14.2. Synthesis: Existing Challenges

The lack of legislative support poses a threat to establishment and thriving of bioeconomy driven initiatives. Funding shortages hinder efficient popularisation of bioeconomy concepts. Last but not least, the cost of collecting and managing biomass is quite high, constituting a considerable obstacle towards the development of the field.

15. CLUSTER OF BIOENERGY AND ENVIRONMENT OF WESTERN MACEDONIA (CLUBE)⁵⁹

Author: Eleni Karachaliou (QPLAN International)

15.1. Description of the Cluster

The Cluster of Bioenergy and Environment of Western Macedonia (CLuBE)⁶⁰ is a platform for cooperation of the three pillars of the regional economy: the public sector, research and entrepreneurship. The cluster seeks to develop synergies between local and regional players and businesses in bioenergy and the environment, introducing and developing innovation in the bioeconomy sector and increasing its added value.

CLuBE is located in Kozani, Greece and is active in the wider area of Western Macedonia (Figure 1). Western Macedonia covers a total surface of 9,451 km², and has a total population of around 300,000. It is divided into four regional units: Kozani, Grevena, Kastoria and Florina. The region's economy is characterised by a strong energy sector (lignite based) producing more than half of Greece's electric power.

Western Macedonia's main resource assets are in the wood sector (forest cooperatives, wood for heating, potential for pellet production, associated small enterprises) and the agricultural sector (fruit cultivation, vineyards, cereal production, herbs). The area has the potential to provide large quantities of wood industry residues, agricultural waste, and forest biomass. Moreover, the region's inhabitants have a background in power generation with four lignite mines producing 50 million tonnes per year and five power stations collectively embodying more than 3,500 MW capacity. This power sector infrastructure employs 6,000 inhabitants and involves more than 200 cooperating small and medium enterprises (SMEs), which also include expertise in district heating. Most of the available biomass in the region of Western Macedonia is used for energy purposes, allowing for development of the bioenergy sector.

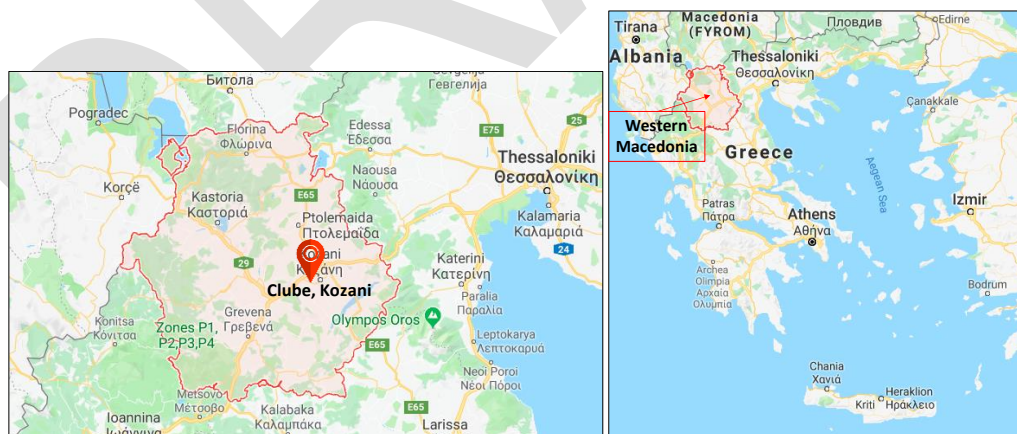


Figure 4: Location Cluster (CLuBE)

Source: Own work

⁵⁹ Information based on the cluster's website and an interview with a cluster representative.

⁶⁰ <http://www.clube.gr/>

Source: Own Work

15.1.1. History of CluBE

CluBE emerged in the early '00's from repeated collaboration of regional key stakeholders on various projects. In February 2014, the cluster was established as a non-profit legal entity with 21 initial members from the public sector, R&D, and entrepreneurship, covering the entire "triple helix" (public sector, academia, business) of the regional bioenergy and environment sector while adopting a bottom-up approach for its activities.

The initial mission of the cluster was to analyse regional biomass potential and the regional innovation systems devoted to the energy sector. In the wider context of decarbonisation, the gradual withdrawal of lignite necessitated the promotion of the use of biomass and the development of renewable energy in the area⁶¹.

15.2. Current Situation

Today CluBE consists of 34 members including regional and local authorities, universities and research institutes (six research organisations/universities/technology centres), as well as various enterprises (28 SMEs). The latter include district heating companies, boiler manufacturers and wood processors, biomass logistics enterprises, and forest and agricultural associations.

CluBE services focus on developing R&D and business activities in the fields of bioenergy and environment, in order to reinforce the circular economy and sustainability in both the region and its surrounding through⁶²:

- domestic and industrial use of biomass for energy
- use of biomass in for energy in district heating
- use of biomass for mixed combustion with lignite in existing thermal power plants, or in future mixed combustion plants for heat and/or electricity
- heating systems performance optimisation
- energy saving in the household sector
- energy saving in the business sector and services
- smart solutions for cities, regions, etc.

Moreover, CLuBE services include:

- access to public funding (regional/national programmes, innovation vouchers, etc.)
- direct advisory services
- facilitation of collaboration between members
- facilitation of cross-sectoral cooperation
- support of knowledge transfer

CluBE's current strategy focuses on promoting bioenergy for heating (especially district heating) to every city in Western Macedonia and the neighbouring regions (Central Macedonia, Thessaly, and Epirus) aspiring to gradually spread adoption of bioenergy throughout the country and even cross its borders.

⁶¹ <https://clube.gr/en/>

⁶² Ibid

The cluster does not have any specific internationalisation strategy yet, but supports its members' participation at missions/events/study visits/fairs outside of Greece - mainly in other parts of Europe.

15.2.1. Current Role and Importance (Function) of the Main Actors

As a Triple Helix Cluster with specific expertise in the fields of biomass and bioenergy, CluBe's membership consists of:

- small and medium enterprises
- policy-makers and supportive bodies
- bioeconomy R&D institutes and educational organisations
- brand owners
- biomass producers

All the members benefit equally from the cluster's services and attend general meetings that facilitate and promote the collective taking of decisions.

CluBe currently does not include consumer groups or civil society networks due to their limited presence as organised entities in the area, but plans on approaching such groups in the future.

15.2.2. Legislative Support Mechanisms

Greece currently has no national/regional instruments or smart specialisation strategies that support the development of the cluster. The only existing support mechanisms that the members of the cluster can benefit from are specific funding EU instruments such as H2020 and Interreg, as well as sectoral and operational programmes under the umbrella of the Partnership Agreement for the Development Framework 2014-2020.

15.2.3. Good Governance

The participation of consumer associations and civil society organizations in the future would greatly encourage the further growth and development of the overall initiative.

15.2.4. Cluster's Mission towards Sustainability

All the three dimensions of sustainability (society, environment, economy) are equally considered within the cluster's strategy. Through the services it provides, the cluster aims at ensuring regional economic growth, entrepreneurship, and employment increase - particularly in less populated agricultural areas. One of the main objectives of the initiative is the reduction of CO2 emissions and the increase in the share of renewable energy. Addressing the issue of wild fires has been a priority as well, along with the core aim of improving forest management.

Though at present the cluster's status is non-profit, CluBe aspires to merge with business entities to turn into a for-profit organisation.

15.3. Synthesis: Existing Challenges

Lack of legislative support mechanisms poses a threat to the establishment of bioeconomy initiatives: the shortage of funding hinders successful and efficient popularisation of bioeconomy. Last but not least, access to biomass is also in many cases restricted.

16. NATIONAL TECHNOLOGY AGRIFOOD CLUSTER (CL.A.N.)

Authors: Matteo Sabini and Serena Borgna (APRE)

16.1. Description of the Cluster

Italy's National Technology Agrifood Cluster (CL.A.N.)⁶³ is a multi-stakeholder network among the key national players in the agrifood chain - a partnership of companies, research centres and institutions set up to promote sustainable economic growth. Based on research and innovation in the industry, CL.A.N. is a partner for Italian and European Institutions.

16.1.1. Location

Institutions participating in the cluster hail from almost all Italian regions:



Source: <https://www.clusteragrifood.it/it/soci/territori.html>

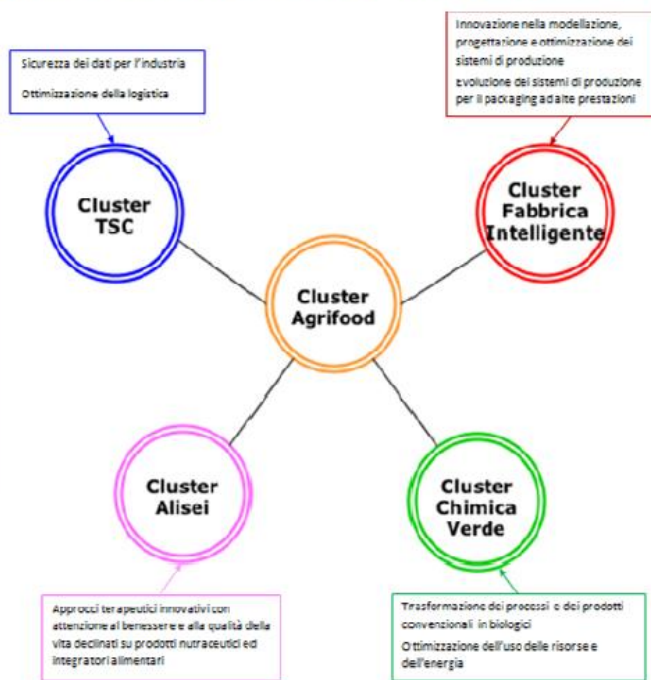
Relevant biomass supply and relevant bioeconomy sectors

The majority of cluster's activity is within and around the food industry, which is the second-largest manufacturing sector in Italy and the third-largest in Europe. In terms of biomass supply, CL.A.N. focuses on reuse of food industry by-products. This includes

- obtaining new food/feed for zootechnical purposes, innovative ingredients and/or bioactive compounds for with a high nutritional value
- adopting innovative processes to exploit by-products left over from agroindustry processing
- reducing agrifood byproducts' disposal costs
- analysing techniques for saving low cost agrifood by-products and their functional components that have a low environmental impact

⁶³ <https://www.clusteragrifood.it/en/>

CONNESSIONI CON ALTRI CLUSTER



Source: CL.A.N. president PPT⁶⁴

The image above, shows the links with the other relevant Italian technology clusters like those in manufacturing, health, chemistry, and transport.

16.1.2. History of the Bioeconomy Cluster

The Italian Ministry of Education and Research issued a call for a national agrifood cluster in May 2012, and CL.A.N. was officially founded in October 2013 by Federalimentare Servizi (Italy's food and beverage industry federation), the northern Italian administrative region of Emilia-Romagna, and various research institutions. In February 2018 CL.A.N. became a legally recognised entity.

16.1.3. Initial Mission and Objectives

The cluster's mission is to increase competitiveness of the agrifood supply chain through innovation resulting from collaboration between research bodies, enterprises, institutions and public administration. CL.A.N. is a partnership of companies, research centres, regional representatives and other stakeholders active in the agrifood sector.

16.1.4. (Inter)National Strategies and Cooperation

CL.A.N. is part of several trans-national networks, including the European Cluster Collaboration Platform, the "Food for Life" National Technology Platforms Network, the

⁶⁴ <http://www.federalimentare.it/clusteragrifood/presentazionecluster.pdf>

Partnership for Research and Innovation in the Mediterranean Area, and Italy's export promotion agency working toward the "internationalisation" of Italian companies.

16.2. Current Situation

16.2.1. Main Actors

CL.A.N. is a non-profit association with 109 members including companies operating in primary production of foodstuffs and food processing. Non-corporate cluster members include industry associations and universities as well as municipalities, public and private research bodies and organisations:

- Forty-six companies and associations
- Forty-nine universities and research centers
- Fourteen regional representatives

As an association, CL.A.N.'s governance includes a president and vice president, an assembly, a council (consiglio di presidenza) acting as management board, and a scientific-technical committee.

16.2.2. Current Mission and Objectives

On the production side, the cluster's mission is to protect and increase the competitiveness of Italy's agrifood supply chain business system from agricultural production to processing and associated industrial sectors (packaging, logistics, etc.), through the innovation and enhancement resulting from scientific research and collaboration between research bodies, enterprises, institutions and public administration.

On the consumption side, the cluster's actions and interventions are aimed at guaranteeing the genuineness and authenticity of high quality and high added value products, preventing or delaying the onset of diet-related-diseases, promoting healthy diets and guaranteeing the environmental sustainability of production.

16.2.3. Main Competitive Products and Stage of Development

Through its flagship project So.Fi.A. (Sustainability of Agrifood supply chain) the cluster has facilitated cooperation among institutions related to specific agrifood products and processes that are in various stages of development/commercialisation, including:

- **Valorisation of dairy by-products, especially residues of ricotta cheese (scotta) and cheese whey for recovery of their bio-molecules.** Cluster members conducted trials of double ultrafiltration steps followed by nanofiltration on scotta and cheese whey that separate and concentrate their proteins, lactose and peptides. The liquid intermediates obtained after ultrafiltration are used in post-processing treatment (enzymatic hydrolysis, oxidation) to turn bio-molecules into bio-active and functional substances like pre-biotics, functional peptides, lactulose and lacto-bionic acid.
- **Strategies for the use and valorisation of beef processing by-products and wastes.** Cluster participants tested the feasibility of using by-products of beef processing for the production of new food (bone chips for gelatin, tallow, and food proteins) as well as non-food products (tallow and animal flour energy production as well as hide depilation). Byproducts that cannot be used for these purposes can be combusted on-site to produce electric and thermal energy satisfying electricity and heat

needs of the respective facility. Valorising beef hides specifically involves development of a biotechnological method for hair removal and exploitation of proteins, bioactive peptides and collagen of the obtained products.

- **Process efficiency in the fresh-cut vegetable industry, with use of otherwise-wasted biomass.** Cluster members are researching technologies for reducing wasted biomass that involve integrated drying processes and associated energy recovery devices as well as "on-farm" systems involving composting aimed at simplifying biomass management to reduce environmental impact.

16.2.4. Current Role and Importance (Function) of the Main Actors

CL.A.N. is a **facilitator of the exchange processes among three categories of actors (research, business, public administration)** by coordinating individuals who are active in research, development and production in the agrifood sector. In Italy, national clusters have **an advisory role towards policy-makers**, helping them identify priority lines of investment for industrial research. They indicate which topics may be of interest to e.g. the Ministry of Education, University and Research in terms of funding.

The majority of members belonging to the "industry" category are "brand owners." Several food manufacturing companies associated with the cluster are biomass producers (e.g. INALCA, GRANAROLO, SADAM).

Consumers and civil society networks are not yet been involved in CL.A.N., but a dialogue has been started.

16.2.5. Legislative Support Mechanisms

CL.A.N. and other Italian national technology clusters are tools for scientific and technological research as per the national research plan of Italy's Ministry of Education, University and Research - they were created in response to that ministry's call for cluster development in 2012 and are intended to facilitate exchanges between research institutions, businesses and public administrations (the so-called "Triple Helix"). CL.A.N. contributed to the activities of the working groups established by Italian federal ministries on the country's Smart Specialisation Strategy for agrifood, as well as consultations regarding the Industry 4.0 initiative and the bioeconomy.

16.2.6. (Inter)National Strategies and Cooperation

As required by the Italian Ministry of Education, University and Research, CL.A.N. is now drafting **a new 3year action plan** based on the three strategic areas of sustainability, quality/safety (with a focus on traceability and "made in Italy") and nutrition/health. Three industrial research projects involving experimental development and training are in the pipeline, the first of which involves international cooperation:

1. SAFE&SMART – new enabling technology for food and safety and integrity of agricultural food chains in a global scenario
2. SO.F.I.A. – sustainability of the Italian agricultural food chain
3. PROS.IT – promotion of consumer health: nutritional enhancement of traditional Italian agricultural food products

Prior international cooperation includes participation of CL.A.N. member institutions in the European technology platform "Food for Life", and the Consortium FoodBest - FoodNexus, set

up to take part in the call for a tender of the European Institute of Technology aimed at funding a food-based “KIC” (Knowledge and Innovation Community).

16.2.7. Good Governance

Involvement of consumers, consumer associations, and civil society (public participation)

The cluster has not involved any of these groups yet, but is currently in dialogue with one consumer organization for future collaboration

16.2.8. Cluster’s Mission towards Sustainability

Are sustainability aspects considered in the cluster’s strategy?

Are the three dimensions of the sustainability (environmental, social and economic) equally considered? If no, which dimension is less/more important for the cluster?

The cluster’s strategy takes all three dimensions into account equally, as the outcomes of the projects it facilitates reduce the food industry’s negative impact on the environment, contribute to public health via advances in nutrition (social sustainability), and increase businesses resilience in the face of reduced resources (economic sustainability).

Is the focus of sustainability placed at the regional level or at the international level (e.g. “Not in my Backyard” issues vs. impacts of biomass production in developing countries)?

The focus is placed at the regional level, as the cluster is an Italian association promoting Italian production and sustainable practices in Italy, albeit with an eye to export markets and international network pursuing similar goals.

16.3. Synthesis: Existing Challenges

What are the main problems/challenges experienced according to relevant actors (e.g. related to funding instruments, support mechanisms, policy framework conditions, network facilitation, etc.)?

The activities of CL.A.N. are limited by the lack of funding dedicated to cluster activities. Bureaucratic/procedural hurdles also delay actions, as clusters are still waiting for a “decree of recognition” releasing the initial financing foreseen for starting their activities.

17. LUCAN'S CLUSTER OF BIOECONOMY (CLB)

Authors: Susanna Albertini and Michela Cohen (FVA Desing)

17.1. Description of the Cluster⁶⁵

In line with the guidelines of the Smart Specialisation Strategy of the Basilicata region, which identify the emerging sector of the bioeconomy as one of five development areas, the Lucan's Cluster of Bioeconomy (CLB)⁶⁶ aims **to promote and support agro-industrial development in Basilicata - focusing on environmental and socio-economic sustainability of production processes**. The initiatives promoted by CLB are coherent with the Italian Bioeconomy Strategy, formally approved in 2017, and with the lines of development of the European Bioeconomy Strategy, launched in 2012.

The CLB intends to operate in close collaboration and synergy with the National Cluster on Green Chemistry (SPRING) and the agrifood industry cluster (CL.A.N.) for Italian bioeconomy development.

As a non-profit association, the CLB is composed of a General Assembly, a Board of Directors containing a president and three vice presidents, and a technical-scientific committee. The General Assembly represents the CLB's members, while the Board of Directors is the cluster's strategic body and develops activities. The technical-scientific committee brings together both the business-oriented members and members belonging to public and private research organisations - it is responsible for R&D and industrial innovation strategies.

17.1.1. Location

Lucan's Cluster of Bioeconomy has a regional impact, involving partners from the Basilicata region



⁶⁵ The information provided is based on an interview with the cluster representative, unless indicated otherwise.

⁶⁶ <http://www.clusterlucanobioeconomia.org/>

17.1.2. Relevant Biomass Supply

The Basilicata region is focused on the agri-food and forestry sector, relevant biomass supply includes:

- Cereals
- Fruits and vegetables
- Viticulture residues
- Olive oil
- Forest biomass (wood products and their waste)
- Blue bioeconomy (marine/fisheries products and their waste)

17.1.3. Relevant Bioeconomy Sector(s)

Lucan's Cluster of Bioeconomy is focused on water resource management, agricultural genomics, nutrition/health, green chemistry, and non-technological innovation in the agri-food industry.

17.1.4. History of the Cluster

The CLB was founded by various public and private institutions under the guidance of the Basilicata region, which adopted a Regional Strategy for Intelligent Research and Innovation 2014-2020, identifying five thematic areas of potential development based on specific clusters. These clusters include the cluster of bioeconomy.

17.1.5. (Inter)National Strategies and Cooperation

The CLB is part of the Smart Specialisation Strategy of the Basilicata region. The new Operational Programme of the Basilicata Region concerning the European Regional Development Fund 2014-2020 (OP-FESR 2014-2020) was adopted by the European Commission on the 17 August 2015.

The cluster also cooperates with the National Operational Programme (PON) Research and Innovation 2014-2020, approved by decision C (2015) 4972 of 14.07.2015, with competence on transition regions (TR) and regions lagging behind (LD) (former Objective regions) 1). That programme focuses on the following five priority areas:

1. Intelligent and sustainable industry, energy and environment,
2. Health, nutrition, quality of life,
3. Digital Agenda, Smart Communities, Intelligent Mobility Systems,
4. Tourism, Cultural Heritage, made in Italy and industry of creativity,
5. Aerospace and defense

17.2. Current Situation

17.2.1. Main Actors

The CLB consists of 59 affiliated members operating in different fields of bioeconomy. Some of the most relevant members are University of Basilicata, the Lucana Development and Innovation Agency, the National Research Council, the Council for Agricultural Research and Economics, and companies (especially SMEs) belonging to the leading manufacturing organisations in the production, harvesting and industrial transformation of biomass.

17.2.2. Current Mission and Objectives

The CLB's mission is to promote bio-economy in the region by contributing to the development of the sector at the regional and national level, to foster the development and competitiveness of bioeconomy businesses, to stimulate public and private research, innovation and technology transfer, to encourage specialised training and employment, and to promote CLB in national and international contexts.

17.2.3. Main Competitive Products

The CLB's most significant members are in the agri-food sector and include major frozen food brand Orogel and candy company Ferrero - the competitiveness of their products, such as Ferrero Rocher, is relevant to the cluster. The Basilicata region is also exploring green industrial chemistry applications for the oil supply chain, targeting fruit and agroforestry as sources for alternative oils from seeds, with potential production of 120,000 tonnes alternative oil per year.

17.2.4. Current Role and Importance (Function) of the Main Actors

The CLB is managed by ALSIA (Agenzia Lucana di Sviluppo e di Innovazione in Agricoltura), the Basilicata region's agency for development and Innovation in the agrofood and agroindustry sectors. ALSIA supports the CLB by incorporating its network of small and medium enterprises (SMEs) and institutional assets such as communication channels, agro extension services, experimental farms and the Metapontum Agrobios Research Center. The agency offers advice and training services for farmers aimed at upgrading agricultural activities to increase production, enhancing the quality of products, and reducing pesticide use. It also provides support and services for water resource use optimisation in irrigation systems. It implements regional, national and EU level research projects that e.g. promote the use of biotechnology in the production processes and valorisation of regional products. It provides technical assistance to support organisation and marketing models based on quality certification systems for agricultural processes and products. ALSIA also manages demonstrative/experimental farms in Aliano, Gaudiano, Matera, Melfi, Metaponto, Villa d'Agri, Nemoli and Rotonda, through which it carries out research activities

The cluster is planning an action to involve citizens, particularly trade unions, with the aim of raising awareness about sustainability. The bioeconomy offers a solution to some of the Basilicata region's problems including unemployment. Important CLB member companies are those that extract oil.

17.2.5. Legislative Support Mechanisms

The CLB receives regional funding, and its members can sometimes take advantage of co-financing by local small and medium-sized enterprises. Funds from European institutions include **IDEEO** and **SPACE 2ID GO**, which aim to develop space technologies in agriculture, marine, and energy areas. The CLB's cooperation with other more internationally-oriented clusters such as the cluster SPRING constitutes its main international involvement.

17.2.6. Good Governance

Consumers and consumer associations are not members of the cluster - neither are civil society organisations.

17.2.7. Cluster's Mission towards Sustainability

Are sustainability aspects considered in the cluster's strategy?

Yes.

Are the three dimensions of the sustainability (environmental, social and economic) equally considered? If no, which dimension is less/more important for the cluster?

Yes.

Is the focus of sustainability placed at the regional level or at the international level (e.g. "Not in my Backyard" issues vs. impacts of biomass production in developing countries)?

Regional Level.

17.3. Synthesis: Existing Challenges

What are the main problems/challenges experienced according to relevant actors (e.g. related to funding instruments, support mechanisms, policy framework conditions, network facilitation, etc.)?

The capacity for cooperation is limited by the small size of companies in Basilicata - larger companies acting as leaders would facilitate development. The lack of public awareness and of an adequate market for the Lucanian food sector also pose barriers.

The region's entrepreneurial culture is not well-developed, which poses challenges to adoption of innovations. Forest and aquatic resources that could be feedstocks are poorly used, particularly in the building and construction industry where there is potential for use of bio-based alternatives to conventional materials (wood, etc.)

18. PARCO AGROALIMENTARE FVG – AGRIFOOD & BIOECONOMY CLUSTER AGENCY⁶⁷

Author: Matteo Sabini and Serena Borgna (APRE)

18.1. Description of the Cluster⁶⁸

The regional cluster “Parco Agroalimentare FVG” is comprised of industries, farmers, associations, and technological parks aiming to exploit biomass resources for food and feed uses as well as biogas and energy production. The group also explores potential new biomass uses.

The cluster is run by a development agency, which is a private entity funded by contributions from industries, research institutions and other regional organisations. It works together with the regional government to promote bioeconomy in coordination with the Smart Specialisation Strategy (S3). The cluster’s executive board has nine members representing different types of entities.

18.1.1. Location

Parco Agroalimentare FVG is located in the north-eastern Italian region Friuli-Venezia Giulia and its activities have a regional dimension, given the collaboration with the local government.

18.1.2. Relevant biomass supply⁶⁹

- Cereals/oilseeds – 130,000 ha of the region (44% of arable lands) are under cereal cultivation, and oilseed cultivation (mainly soy) account for 54,000 ha or 38% of arable land. Biomass resources from these crops constitute the largest bioeconomy contribution in the region, as biogas production has turned old refineries owned by Italian oil company ENI into bio-refineries.
- Manure – with direct use of manure as a fertiliser banned in some areas due to correlating high nitrate concentrations, companies have built biogas plants where manure is used in combination with cereals for energy production. By-products of this process have lower nitrate levels and can thus be used as fertiliser.
- Wood – the region is rich in forest resources, with 320,000 ha being forested and containing an estimated total volume of 45 Mio m³ of timber that is increasing by 1 Mio m³ every year. However, severe weather in Autumn 2018 destroyed an estimated 25,000 ha of forest in the Belluno province alone, corresponding to 10 Mio m³ of timber⁷⁰.



⁶⁷ The information provided is based on an interview with the cluster representative, unless indicated otherwise

⁶⁸ <http://www.parcoagroalimentare.it/>

⁶⁹ <http://www.parcoagroalimentare.it/bioeconomia>

⁷⁰ https://corrieredelveneto.corriere.it/veneto/cronaca/18_novembre_02/venezia-2-3-documentodcorriereveneto-web-veneto-c126dabe-de06-11e8-a856-7ee3f30dc6c8.shtml

- Algae –old aquaculture companies have experienced a decline in revenues and are increasingly interested in substituting fish farming with algae cultivation in their existing lagoons. In the cluster’s vision, algae represent a significant opportunity for growth in the bioeconomy sector, although the region’s S3 strategy lacks such a vision and is currently under revision.

Currently, biogas and bioenergy represent a well-developed regional sector⁷¹, with 71 biogas plants (700 kW average production per plant) using mainly a mixture of animal manure and cereal scraps. Other resources used for the energy production are urban wastes, dedicated biomass crops and sewage sludge. In addition, in 2014 the 19,12% of timber production was used in the energy production. In the future, the cluster aims to implement the utilisation of algae for energy production.

The cluster plans to explore other biogas sources⁷² in the next few years - biomass from arable lands can represent an opportunity for the production of biofuels, the creation of pharma and nutraceutic bio-based products, the implementation in the chemical industry.

18.1.3. History of the Bioeconomy Cluster

The cluster was the result of a cooperation path in agriculture started in 1999, when an agency for the development of the regional agrifood district was created. At the beginning, cluster activities were focused mainly on food production and commercialisation: a wider approach, with a focus on the creation of added-value products from the re-use of resources, was adopted only in 2017, when the cluster’s activities were extended to the bioeconomy sector⁷³. Currently, the regional agency works as promoter of the cluster and supports its growth.

Parco Agroalimentare FVG cooperates with other Italian and European clusters⁷⁴.

At the national level, Parco Agroalimentare FVG takes part in the activities of the National Technology Agrifood Cluster (CL.A.N.), the Italian Cluster of Green Chemistry (SPRING) and the as yet not fully operative National Cluster Blue Italian Growth (BIG). The regional cluster has representatives in the scientific committees of both CL.A.N. and SPRING.

At European level, Agrifood FVG is a member of the Cluster Collaboration Platform and it is certified with the “Bronze Label – Cluster management Excellence” by ESCA (European Secretariat for Cluster Analysis).

18.2. Current Situation

Main actors involved in the agency that run the cluster are⁷⁵:

Member	Type of entity
Federazione delle Banche di Credito Cooperativo del Friuli Venezia Giulia - società cooperativa	<u>Bank</u>
CCIAA Udine	<u>Chamber of Commerce</u>

⁷¹ <http://www.parcoagroalimentare.it/bioeconomia>

⁷² <http://www.parcoagroalimentare.it/bioeconomia>

⁷³ <http://www.parcoagroalimentare.it/agenzia>

⁷⁴ <https://www.clustercollaboration.eu/cluster-organisations/parco-agroalimentare-fvg-agrifood-bioeconomy-cluster>

⁷⁵ <http://www.parcoagroalimentare.it/gli-organ>

Consorzio del Prosciutto di San Daniele	<u>Food</u> consortium
Unione Artigiani piccole e medie imprese - Confartigianato	<u>Association</u>
Confindustria Venezia Giulia	<u>Association</u>
Unione degli industriali della provincia di Pordenone	<u>Association</u>
CE.F.A.P. - Centro per l'educazione e la formazione agricola permanente	<u>Educational</u> institution
Gruppo Bisaro - Sifa S.r.l.	Large company
Pascolo quality food s.r.l.	SME
Piva Enzo	SME
Associazione piccole e medie industrie - Udine	<u>Association</u>
Confindustria Udine	<u>Association</u>
Microglass s.r.l.	<u>SME</u>
Consorzio per la tutela del formaggio Montasio	<u>Food</u> consortium
Confcommercio imprese per l'Italia - Udine	<u>Association</u>
C.I.A. - Confederazione italiana agricoltori della provincia di Udine	<u>Association</u>
Federazione provinciale Coldiretti di Udine	<u>Association</u>
CNA - Confederazione Nazionale dell'Artigianato	<u>Association</u>
Friuli innovazione - centro di ricerca e di trasferimento tecnologico s.c.a r.l.	Research institution
Biolab srl	SME

Table 2: Actors running the cluster Parco Agroalimentare FVG

The cluster's priorities for the bioeconomy sector are⁷⁶:

- use of cereals and oilseeds as resources for bio-based production, also at an industrial level
- exploitation of coastal areas for the production of algae
- strengthening of cooperation between cluster members, regional universities (University of Udine and University of Trieste) and the industrial areas already working in bio-products (such as the industries working on cellulose and based in Torviscosa) with the aim to create a collaboration framework for the regional bioeconomy sector development

18.2.1. Current Role and Importance (Function) of the Main Actors

The most active cluster members are cereal farmers representatives of the forestry sector, due to their respective importance to the region's economy.

There is close collaboration between the cluster and local policy makers, in particular on re-defining the regional strategy on bioeconomy. Although the cluster currently does not include consumer groups or civil society organisations, it is currently engaged in mapping relevant civil

⁷⁶ <http://www.parcoagroalimentare.it/bioeconomia>

society representatives to facilitate their involvement in the future strategy definition and action implementation.

18.2.2. Legislative Support Mechanisms

At the local level, the regional government actively involves the cluster in the definition and implementation of its S3 Strategy, jointly with other industrial consortia, universities and technological parks of the Friuli-Venezia Giulia region.

In particular, the project RIE3 – Regional Innovative Environment 3 was launched with the purpose to enhance technological transfer and cooperation among all regional entities involved in research and innovation. The stakeholders involved launched temporary consortia working in various thematic areas, one of which is the bioeconomy⁷⁷.

At the European Level, Parco Agroalimentare FVG has a technical role in supporting regional government in the management of the local quadruple helix part of the S3 strategy, within the sub-platform “Traceability & Big Data”⁷⁸.

Two rounds of ERDF call for funding on bioeconomy sector were put into place and especially the second round obtained great success.

The cluster is cooperating with the two national clusters CL.A.N. and SPRING on mapping technologies and skills, and on identifying the existing and emerging innovation and training needs in the region.

18.2.3. Good Governance

Aiming to increase the quality of the contribution gathered by stakeholders in the regional strategy definition, the cluster has employed the Entrepreneur Discovery Process methodology (EDP) implemented during workshops: the cluster identifies regional working groups based on a specific topic and gathers their perceptions and opinions on possible weaknesses, barriers, potentialities and best/worst practices. Then it organises a workshop on the specific topic with 10-50 participants who are then pushed by organisers to express “unmediated” positions, resulting in qualitatively higher dialogue.

18.2.4. Cluster’s Mission towards Sustainability

The cluster’s activities reflect primarily the environmental and economic aspects of sustainability, with e.g. algae farming and use of manure as feedstock contributing mainly to environmental sustainability and economic development/jobs in the region. To increase the social aspect of sustainability, the cluster aims to increase involvement of consumer and civil society organisations.

18.3. Synthesis: Existing Challenges

Logistical difficulties hampered the activities of the cluster early on, as the roles of various cluster members (particularly the agency) were not clear. This problem has been resolved, making involvement of civil society the cluster’s main challenge.

⁷⁷ <http://www.parcoagroalimentare.it/rie3>

⁷⁸ <http://s3platform.jrc.ec.europa.eu/traceability-big-data>

19. SPRING - THE ITALIAN CLUSTER OF GREEN CHEMISTRY

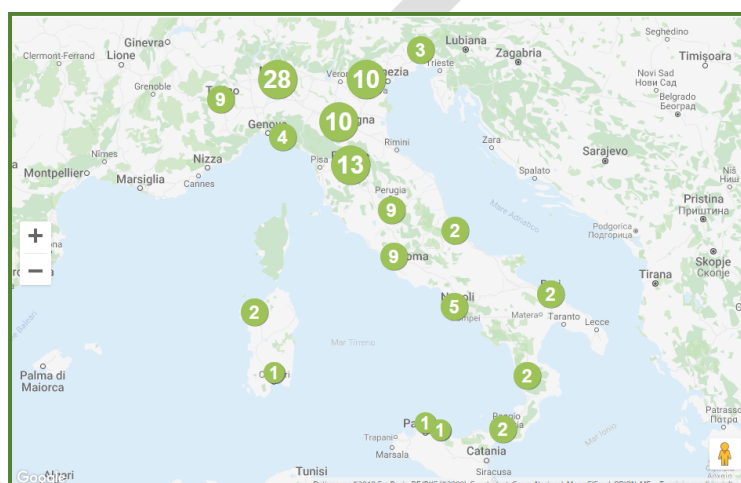
Authors: Susanna Albertini and Michela Cohen (FVA Design)

19.1. Description of the Cluster⁷⁹

The Italian Cluster of “Green Chemistry”, Sustainable Processes and Resources for Innovation and National Growth (SPRING)⁸⁰, has the objective of triggering the development of bio-based industries in Italy. It employs a holistic approach to innovation, aimed at revitalising Italian chemistry in the name of environmental, social and economic sustainability. The purpose is to stimulate research and investment in new technologies, in constant dialogue with the actors of local areas, and to pursue the European Commission’s most recent policies on bioeconomy.

19.1.1. Location

SPRING’s activity has a national impact, involving partners from most of the Italian regions.



19.1.2. Relevant Biomass Supply

The relevant biomass supply corresponds to the sources identified in Italy’s Bioeconomy Strategy: agricultural waste, food industry by-products, leather industry by-products, and waste water.

19.1.3. Relevant Bioeconomy Sector(s)

SPRING members all operate in the bioeconomy sector in various ways and represent the whole Italian industry of “green” chemistry: they are big industrial players, small and medium enterprises (SMEs), universities, and all the main Italian public research organisations active in the fields of biomass harvesting and processing. A number of actors operating in the fields of technology transfer and environmental communication are also members of the cluster.

⁷⁹ The information provided is based on an interview with the cluster representative, unless indicated otherwise

⁸⁰ <http://www.clusterspring.it/>

19.1.4. History of the Cluster

The SPRING Cluster was created in 2012 as a joint initiative of Biochemtex, Novamont, Versalis and Federchimica in response to a call by the Italian Ministry of University, Education and Research (MIUR) titled “Avviso per lo sviluppo e potenziamento di Cluster Tecnologici Nazionali” (Notice for the development and strengthening of national technological clusters), as per a Directorial Decree. The goal of the call was to identify entities – organised enterprise networks, universities, public or private research institutions and subjects active in the field of innovation, from various local areas– that could act as engines of sustainable economic growth of the whole national economic system and territories, in line with European strategic agendas and with the objectives of Horizon 2020, the European Union Framework Programme for Research and Innovation for 2014-2020. In December 2012, the SPRING Cluster was officially acknowledged by the MIUR as a representative organisation of the Italian sector of green chemistry.

19.1.5. (Inter)National Strategies and Cooperation

To date, eleven Italian Regions – Basilicata, Campania, Emilia Romagna, Friuli Venezia Giulia, Lombardy, Piedmont, Puglia, Sardinia, Tuscany, Umbria, Veneto and Autonomous Province of Trento – have committed themselves to supporting the cluster’s activities. They affirm compatibility of their development strategies and programming documents with the vision and goals of the cluster, as well as their will to pursue cooperation by promoting activities to sustain the development of SPRING.

Representatives of these regions are part of a permanent working group with SPRING that facilitates debate - conceived as a common platform to enable shared and coordinated positions on possible lines of action, this “round table” discusses technology innovation, interregional cooperation, development policies and strategies, as well as participation in regional or multiregional programmes co-financed at a national level and belonging to an Italian shared strategy. The group also shares tools and case studies of excellence, and organises training activities and employment incentive measures in the field of “green jobs”.

On the international level, the cluster participates in the GRACE Project (Growing Advanced Industrial Crops on marginal lands for Biorefineries), submitted in response to the “**BBI 2016.D2** – improvement and adaption of industrial crop varieties and novel sources of biomass to diversify biomass feedstock for biorefineries” call for proposals and led by the University of Hohenheim. Within this five-year project, which was launched in 2017, SPRING is responsible for the industry panel and the dissemination and communication activities on the theme of bioeconomy.

SPRING is also a partner in the international POWER4BIO Project, a CSA funded by H2020, which aims at empowering regional stakeholders to boost the transition towards bioeconomy regions in Europe by providing them with the necessary tools, instruments and guidance to develop and implement sound sustainable bioeconomy strategies. SPRING is an associated member of the Biobased Industries Consortium. At European level, the cluster participates in that group’s green chemistry and bioeconomy events. The cluster also organises the Italian Forum on Industrial Biotechnology and Bioeconomy, which brings together the main EU bioeconomy players annually.

19.1.6. Main Actors

The cluster SPRING is composed of 120 public and private bodies in R&D and innovation in collaboration with major players in the Italian 'chemical from renewable sources sector'. The cluster wants to contribute to the creation of new agro-industrial integrated value-chains and to participate in the definition and promotion of an Italian strategy on bioeconomy.

19.1.7. Current Mission and Objectives

SPRING's main aim is to create a market for bio-based products. This is achieved through a number of activities designed along four lines: dissemination, industrial innovation, research, and regionalisation. The cluster's goal is to foster the development of bioindustries in Italy through a holistic approach to innovation, meant to revive the Italian chemical sector under the name of environmental, social and economic sustainability. It aims to create synergies among innovative entities active in the green chemistry sector to foster a new bioeconomy, laying conditions for the growth of an attractive, dynamic, innovative and competitive continuously growing industrial and academic context. This requires a strong, cohesive and representative community of regional, national, European and international institutions that promotes its visibility and reputation among the broad public and experts.

SPRING's actions on the short, medium- and long-term focus on four main pillars:

- **use of renewable resources as raw materials** through the determination of the local most appropriated species, such as scraps or dedicated crops, to be used in biorefinery processes; the identification and use of marginal and/or contaminated lands; the promotion of the cascade uses of biomass and the construction of new agro-industrial value chains;
- **creation of biorefineries integrated into local areas** to obtain high value-added products (biochemicals, biomaterials); the development and optimisation of innovative technologies and efficient processes involving the reconversion of decommissioned industrial areas;
- **development of new biobased products** (partially or totally obtained from renewable resources), with low environmental impact and social as well as economic benefits;
- **implementation of specific actions** in support of R&D activities, in order to contribute to the growth of investments in innovative technologies and in pilot plants and to stimulate bioeconomy at a national and regional level.

19.1.8. Main Competitive Products

Bioplastic, biogas, bio-based material, advanced biofuel, nutraceuticals

19.1.9. Current Role and Importance (Function) of the Main Actors

The founders of cluster SPRING are:

- Federchimica, the National Federation of Chemical Industry with strong interest in the chemistry from biomass (biorefineries) and related biotechnology. SPRING is located at Federchimica's office.
- Novamont contributes to the creation of a new industrial policy capable of combining the demands of development with sustainability, thanks to the use of renewable sources for the production of bioplastics for low environmental-impact applications.

- Biochemtex is a global leader in the development and engineering of technologies and biochemical processes based only on the use of non-food biomass as an alternative to fossil resources such as oil. In collaboration with Beta Renewables, Biochemtex develops technologies and plants for the production of bioethanol and other chemicals.
- Versalis (Eni) is the largest Italian chemical company, and leader in the production of intermediates, polyethylene, styrene elastomers. It is engaged in the repositioning of its business with a focus on market-oriented product portfolio, the strengthening of research and licensing, and the international expansion.

SPRING is divided into different committees: the industrial committee, the non-profit associations committee, dissemination, and public and private companies.

19.1.10. Legislative Support Mechanisms

National or regional instruments that support the development of the cluster, e.g. smart specialisation strategies:

No.

Other policies and measures at national and regional level to support bio-based businesses and facilitate multi-stakeholder and cross-sector cooperation: No.

Funding instruments, including ERDF: Financial support is covered by membership fee and EU funded projects SPRING is involved in (GRACE and POWER4BIO).

19.1.11. (Inter)National strategies and cooperation

2 memorandum of business understanding, bioindustrial innovation Canada (Ontario) and Green win innovation cluster of Wallonia.

19.1.12. Good Governance

SPRING does not include specific consumer groups or civil society organisations as members, but carries out dissemination activity (events and participation in fairs) to convey its actions to the public - it also supports a university degree programme (Masters) in circular economy.

19.1.13. Cluster's Mission towards Sustainability

Are sustainability aspects considered in the cluster's strategy?

Are the three dimensions of the sustainability (environmental, social and economic) equally considered? If no, which dimension is less/more important for the cluster?

Yes.

Is the focus of sustainability placed at the regional level or at the international level (e.g. "Not in my Backyard" issues vs. impacts of biomass production in developing countries)?

National level.

19.2. Synthesis: Existing Challenges

What are the main problems/challenges experienced according to relevant actors (e.g. related to funding instruments, support mechanisms, policy framework conditions, network facilitation, etc.)?

The main challenge is creating a market for bioproducts - this includes supporting demand, making a labelling system, and correlating education and communication activities. Another challenge is creating a tax system that can favour a connection between biobased products and fossils. Involving the regions and provinces in the development of the bioeconomy has also been a challenge

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20. CLUSTER CENTROHABITAT

Author: Pietro Rigonat (LOBA)

20.1. Description of the Cluster ⁸¹

The Cluster CentroHabitat⁸² brings together companies, municipalities, R&D centres, business associations and other entities working in the construction sector, and is committed to sustainability as a driving factor for innovation and competitiveness. CentroHabitat covers a wide value chain, ranging from construction to rehabilitation areas, from the extractive sector to the processing of building materials, involving suppliers of goods and provision of equipment for the built environment.

20.1.1. Location

The cluster is headquartered in the city of Aveiro. Members hail from all over the country. The cluster has been particularly active in the central region of Portugal “Centro”.

20.1.2. Relevant Biomass Supply

The Habitat cluster’s main feedstocks are wood, cement and similar intermediate and/or end-products.

20.1.3. Relevant Bioeconomy Sector

Construction

20.1.4. History of the Bioeconomy Cluster

The cluster was recognised by the government in 2009 under the framework of “Strategies for Collective Efficiency” (Estratégias de Eficiência Coletiva (EEC/QREN). In February 2017, the Portuguese government recognised it as a “consolidated cluster for competitiveness” for a period of more than six years.

20.2. Current Situation

20.2.1. Main Actors

- R&D institutes and educational organisations: 23
- Consumers and civil society networks: 8 municipalities, 15 associations
- Brand owners: 102 enterprises
- Biomass producers, including Associations: none

20.2.2. Current Mission and Objectives

The objective for this cluster is **to develop, through innovation, skills and modernization of enterprises, increasing their competitiveness**, mobilizing for such purpose a set of different cluster entities.

⁸¹ The information provided is based on an interview with the cluster representative, unless indicated otherwise.

⁸² <http://www.centrohabitat.net/en>

The members of this cluster are committed to:

- creating synergies for the development of new products, technologies and building systems;
- promoting new practices in designing space and surrounding areas;
- Establish synergies among companies and R&D entities;
- Develop skills to get new market opportunities regarding sustainable construction;
- To increase the competitiveness of enterprises as a result of more added value of the products and business services oriented by the concept of sustainable construction.

2014-2020 projects⁸³

- **SIG HABITAT⁸⁴** - Sistema de Informação e Gestão do Cluster Habitat Sustentável
The project "SIG HABITAT - Information and Management System of the Habitat Cluster" promotes competitiveness in the built environment value chain by providing tools that induce cooperation (projects, seminars, workshops, fairs, trainings), business matchmaking opportunities between companies and scientific and technological entities, and updated centralised information on sustainable construction
- **LEAN.CO⁸⁵** supports the transition of the construction sector towards a more competitive and productive model. The project implements a training programme in LEAN CONSTRUCTION for professionals from the construction sector. The methodology increases the competitiveness of workers, enterprises, and their work flow.
- **DEGREN⁸⁶** - Cross-Border Center of Ecodesign Business Innovation in EUROACE - DEsign & GReen Engineering. A cross-border Ecodesign Center in the EUROACE region (Extremadura-Alentejo-Centro) promotes the development of ideas, research and projects in "ecodesign" to allow new business models based on ecodesign and the circular economy.
- **SUDOKET⁸⁷** - Mapping, consolidation and dissemination of Key Enabling Technologies for the construction sector in the SUDOE space
The SUDOKET project enhances research and development capabilities at universities and R&D centres through connections and synergies among builders, manufacturers, designers and technologists. SUDOKET contributes to Europe's growth and technological leadership in the building sector through a transnational and cutting-edge approach to technology promotion and the interaction among value chain actors.

20.2.3. Main Competitive Products and Stage of Development

All products and materials are already in the market and have TRL 8/9, they include:

- Isolating materials out of cork (<http://www.centrohabitat.net/pt/solucao/isolamentos-de-cortica>)

⁸³ <http://www.centrohabitat.net/pt/projetos>

⁸⁴ http://www.sighabitat.pt/index.php?site_lingua=en

⁸⁵ <http://microsites.fundacionlaboral.org/leanco?pag=12&idioma=1>

⁸⁶ http://www.degren.eu/?page_id=3556&lang=en

⁸⁷ <http://www.centrohabitat.net/en/proyecto/sudoket-mapping-consolidation-and-dissemination-key-enabling-technologies-construction>

- Decorative products out of wood derivatives (<http://www.centrohabitat.net/pt/solucao/produtos-decorativos-em-derivados-de-madeira>)
- Construction products out of wood derivatives (<http://www.centrohabitat.net/pt/solucao/produtos-para-construcao-em-derivados-de-madeira>)
- Prefabricated construction products out of cement (<http://www.centrohabitat.net/pt/solucao/prefabricados-de-betao-para-construcao>)
- Air-conditioning, ventilation and lighting products (<http://www.centrohabitat.net/pt/solucao/equipamentos-de-climatizacao-ventilacao-e-transmissao-de-iluminacao>)
- Coatings (<http://www.centrohabitat.net/pt/solucao/fabricacao-de-solucoes-de-revestimento-e-protecao>)
- Chalk panels (<http://www.centrohabitat.net/pt/solucao/fabricacao-e-comercializacao-de-placas-de-gesso>)
- Aluminium systems (<http://www.centrohabitat.net/pt/solucao/aluminium-systems>)
- Ceramic coatings (<http://www.centrohabitat.net/pt/solucao/producao-e-comercializacao-de-pavimentos-e-revestimentos-ceramicos>)
- Cement artefacts (<http://www.centrohabitat.net/pt/solucao/producao-de-artefactos-de-betao>)
- Expanded clay (<http://www.centrohabitat.net/pt/solucao/fabricacao-de-argila-expandida>)

20.2.4. Current Role and Importance (Function) of the Main Actors

The entities forming this Cluster intend to create synergies for the development of new products, technologies and building systems, a new practice in designing space and surrounding areas, leading to an attitude of innovation through the built environment sustainability, aiming to generate competitiveness.

This cluster has adopted the subject of Sustainability as a dynamic factor to its strategic development, aiming to contribute for a more "Sustainable Habitat". Sustainability is the driving force for innovation and the desired transformation for the cluster, with impact on economic, social and environmental aspects.

While, in the national market, the strategic perspectives interventions mainly related to rehabilitation, conservation and qualification of the built heritage, in the international market, especially in developing countries, the prospect is also related to new construction.

In both markets, the statement of a specialization in sustainable construction by companies and other cluster agents can be an element of differentiation, generating factors of international competitiveness.

If some of the main actors are absent, why is that? Are there difficulties of involving certain actors?

Main actors are companies involved in the construction materials sector, companies supplying building equipment for e.g. temperature regulation, municipalities that control building codes and compliance - these types of institutions are members of the cluster. The cluster lacks actors working in wood construction, but for Portugal this is still a niche market. Construction companies deal primarily with ceramic, bricks, and cement.

20.2.5. Legislative Support Mechanisms

National or regional instruments that support the development of the cluster, e.g. smart specialisation strategies

The cluster has 2 supporting measures:

1. Cluster policy from the government (national level)
2. Support for cluster-driven actions (50% financing from ERDF): this support concerns solely the management of the cluster and was assigned to it thanks to 2017 government recognition as Cluster for Competitiveness since a period of more than 6 years

Other policies and measures at national and regional level to support bio-based businesses and facilitate multi-stakeholder and cross-sector cooperation

The cluster participated in the design of Portugal's national and regional Smart Specialisation Strategies in 2012 and 2014, especially those of the central region of Portugal where the cluster has been particularly active. Thanks to this, the "habitat environment" (Habitat: Eco-construction, sustainable production and consumption, new materials and innovation applications) was added as a priority in the Portuguese Smart Specialisation Strategy.

The cluster coordinated one of the four smart specialisation areas of the Smart Specialisation Strategy of Portugal's central region (Centro) - the "sustainable industrial solutions" category. The cluster disseminated information and trained companies in this region.

Funding instruments, including ERDF

Use of ERDF (i.e.: <http://www.centrohabitat.net/pt/projecto/sig-habitat>) and Erasmus+.

20.2.6. Good Governance

Involvement of consumers and consumer associations (public participation)

Architects and engineers are consumers for this cluster in the sense that they are recipients of knowledge dissemination by being involved in the activities of the cluster (congresses, seminars, etc.), but consumers of the end product (the general public) are not involved. The cluster focuses on companies.

Involvement of civil society organisations (public participation)

The cluster counts municipalities and the Portuguese Energy Agency (Adene) among its members.

20.2.7. Cluster's Mission towards Sustainability

Are sustainability aspects considered in the cluster's strategy?

Yes. The cluster manages an initiative recognising efforts in the field of sustainability, called the Sustainability Seal. The seal represents an objective and rigorous criterion. The cluster also created a set of tools based on Life Cycle Assessment Type III to verify and register Environmental Product Declarations in Portugal's construction sector. The system ("DAPHabitat") makes rules for products categories ("RCPs" available to members, allowing them to assess through the Environmental Product Declaration where they most use water, energy, etc. This fosters eco-innovation, with special focus on eco-design considering the habitat value chain.

Are the three dimensions of the sustainability (environmental, social and economic) equally considered? If no, which dimension is less/more important for the cluster?

The cluster focuses on environmental sustainability as an innovative business factor.

20.3. Synthesis: Existing Challenges

What are the main problems/challenges experienced according to relevant actors (e.g. related to funding instruments, support mechanisms, policy framework conditions, network facilitation, etc.)?

The challenges faced by the cluster are political in nature: Portugal experienced a severe construction crisis starting from 2011, and in 2014 there was a government change that brought five different ministries over the past seven years. The result was a “stop and go” policy that affected the competitiveness of the members of the cluster. Furthermore, being a member of the cluster offers no added value to companies - there are no benefits in terms of government recognition or support to incentivise firms to undertake additional efforts of participating in a cluster.

21. BLUEBIO ALLIANCE (BBA)

Author: Pietro Rigonat (LOBA)

21.1. Description of the Cluster⁸⁸

The BLUEBIO ALLIANCE (BBA)⁸⁹ is a non-profit Portuguese association, founded in Cascais in July 2015, representing all players in the marine bioresources and blue biotech value chain. Their goal is to promote and develop the blue bioresources sector. It is a national network that includes all subsectors of the marine bioresources value chain in Portugal. It includes raw material producers, R&D units, small and medium biotech enterprises and manufacturers, public sector entities and support companies, as well as consumer product developers.

BBA fosters growth of small and medium enterprises (SMEs) and their internationalisation by connecting all actors of this value chain. The cluster increases their outreach and exports, leading to more jobs and value creation for Portugal. Additionally, BBA is the national voice for the sector, advocating for its interests at the national level with policy briefs and guidelines. At the European level, BBA solicits H2020 and science funding opportunities, and at the global level it promotes internationalisation of the sector.

21.1.1. Location

The participating large companies, start-ups, SMEs, business associations, R&D institutions and supporting entities come from all over Portugal. Large companies often maintain a network of offices in different regions.

21.1.2. Relevant Biomass Supply

The cluster does not directly supply marine bioresources - rather, businesses dealing with marine biomass from e.g. marine fisheries, mangroves, coral reefs and seagrass through consultancy, partnerships, and incubator services.

21.1.3. Relevant Bioeconomy Sector(s)

The cluster supports the whole blue bioresources value chain, which integrates stakeholders ranging from bioresource collectors to raw material producers, from R&D units generating new knowledge to biotech start-ups and innovative SMEs that produce blue applications and products. The value chain includes stakeholders involved in the transformation and processing of products, as well as consumer product developers and distributors⁹⁰.

Since marine bioresources serve as raw material for a wide variety of market applications, but can also be themselves the final product, the cluster supports sectors such as: biodiscovery, molecular biology, microbiology, nanobiotechnology, bioinformatics, etc.

The five sectors the cluster is most focused on (as they boast higher potential for sustainable blue growth) are: renewable energy, mineral resources, aquaculture, coastal & maritime tourism, and biotechnology.

⁸⁸ The information provided is based on an interview with the cluster representative, unless indicated otherwise.

⁸⁹ https://www.bluebioalliance.pt/en_GB/

⁹⁰ https://www.bluebioalliance.pt/en_GB/value-chain/the-bioresources-value-chain/

21.1.4. History of the Bioeconomy Cluster

BlueBio Alliance (BBA) was founded by Tiago Pitta e Cunha, Miguel Herédia, and Joaquim Macedo de Sousa with the support of Cascais City Council -it started its activities in February 2015. Helena Vieira leads this network as Executive Director, with a team of representatives from various institutions including Elisabete Matos (Soja de Portugal), Helena Abreu (AlgaPlus), Joana Moreira da Silva (3Bs) and Susana Moreira (CIIMAR). BBA's official launch took place in April, 2015 with support from representatives of the highest level of Portuguese government.

21.2. Current Situation

21.2.1. Main Actors

- Five large companies
- Thirty-one start-ups and SMEs
- Four business associations
- Seven R&D institutions
- Eleven support entities (incubators, innovation centres, foundations, legal advice societies, etc.)

21.2.2. Current Mission and Objectives

BBA focuses its range of actions in 4 **main pillars**:

1. **Scale & cooperation - organise and streamline the value chain** through information sharing, networking, company promotion, lobbying, creating incentives, and launching mobiliser projects at the national level.
2. **Focus on companies - promote collaboration** between research and knowledge centres, promote academic training activities in business and corporate themes. Promote cross-fertilisation of knowledge between both groups through actions focused on cooperation and sharing.
3. **Path to internationalisation - internationalise** the network of partners by promoting relevant information (market intelligence), supporting its integration in international networks and platforms, and its access to the global market for biotech applications.
4. **Promote financing and access to funds** - apply for structural public funds and European funds, promote actions with national and international private investors⁹¹.

VISION: To turn Portugal into an international leader for the development of marine bioresources and blue biotech.

MISSION: To support, organise and foster the Portuguese marine bioresources value chain.

OBJECTIVES: The network intends to help the market to gain maturity and the companies to increase in number, as well as to gain customers and scale. The final objective is the generation of value and the creation of jobs in the sector of bio-organisms, as well as their projects.

⁹¹ BlueBio Alliance, *Uma rede para acelerar o desenvolvimento do sector dos biorecursos marinhos em Portugal, Documento Estratégico e Fundacional*, April 2015

WHEN: January 2016 – December 2016

Norway roadshow for a blue biotech common innovation degree: an EEA funded blue innovation project with an exploratory mission to Norway seeking to implement a post-graduation course within the sea economy sector

WHEN: January 2016 – December 2016

PARTNERS: Porto Business School

X-Lisbon, supported by Turismo de Portugal: The X-Lisbon is a unique cross-sector innovation, acceleration and incubation programme, where entrepreneurs from all over the world, from different sectors of activity – agrifood, sea, health & nutrition, ICT, biotechnology, bioeconomy, and tourism & gastronomy – design and validate their business models.

WHEN: 2017-2018

WHAT: The X-Lisbon programme fostered the creation of added value start-ups and developed disruptive new businesses within existing companies.

HOW: Experts and mentors used LEAN methodologies to enhance opportunities for SMEs with the support of a cross-sector ecosystem.

PARTNERS: INOVISA, DNA Cascais, BBA, TECLABS, HEALTHCARE CITY

Main competitive products and stage of development

The cluster does not develop products.

21.2.3. Current Role and Importance (Function) of the Main Actors

Entrepreneurs, including large-scale industries and small and medium enterprises

36 companies in total (5 large companies and 31 start-ups and SMEs).

Policy-makers and supportive bodies

The cluster was created with support from the municipality of Cascais, which provides BBA with free office space⁹².

Bioeconomy R&D institutes and educational organisations

7 R&D Institutions.

Consumers and civil society networks

Consumers of final products as well as consumer associations are not involved in BBA activities. There are as yet no large consumer companies or big retailers in the BBA membership.

Brand owners

5 large companies

Biomass producers, including associations

⁹² https://www.bluebioalliance.pt/en_GB/activities/anchor-projects/

4 business associations

If some of the main actors are absent, why is that? Are there difficulties of involving certain actors?

The cluster lacks actors at the end of the value chain, such as big consumer companies. Engaging such entities is problematic because their businesses go beyond the “blue”, such that they do not see added value in the blue bioeconomy.

21.2.4. Legislative Support Mechanisms

National or regional instruments that support the development of the cluster, e.g. smart specialisation strategies and Other policies and measures at national and regional level to support bio-based businesses and facilitate multi-stakeholder and cross-sector cooperation

Blue bio value

Blue Bio Value⁹³ is an acceleration programme originally founded by Oceano Azul Foundation⁹⁴ and Calouste Gulbenkian Foundation⁹⁵ - BBA is a partner. The programme identifies start-ups with high innovation and growth potential in the blue bioeconomy field. The acceleration programme strives to attract international businesses in addition to national ones.

BBA selects the most promising start-ups, which then have two months to work in the acceleration programme. Afterwards, BBA invites its members to meet the start-ups during “boot camps,” with special regards to members providing legal and intellectual property consulting.

At the end of the acceleration programme, the three start-ups with the best performance receive a €15,000 voucher for services of the Blue Demo Network in Portugal.

Blue Demo Network

The Blue Demo Network⁹⁶ promotes and makes accessible a set of Portuguese infrastructures focused on the blue-bioeconomy theme. The supporting services for start-ups range from access to offices or laboratories for biotech/ biochemistry/etc., to business incubation.

Funding instruments, including ERDF

The cluster applies for all EU funding programmes, from H2020 to ESIF funds.

21.2.5. (Inter)national strategies and cooperation

One focus of the cluster is the **internationalisation of SMEs**. Initiatives of the Blue Demo Network feature a structured network of supporting organisations including the University of Aveiro, business incubator of Figueira da Foz, Miranda & Associados (international legal advisers), Biotrend (research-based company specialised in the development, optimisation and scale-up of bio-processes), CIIMAR - Interdisciplinary Centre of Marine and Environmental Research, etc.

⁹³ <https://www.bluebiovalue.pt/>

⁹⁴ <https://www.oceanoazulfoundation.org/>

⁹⁵ <https://gulbenkian.pt/>

⁹⁶ https://www.bluebioalliance.pt/en_GB/blue-demo-network/

21.2.6. Good Governance

Involvement of consumers and consumer associations (public participation)

Consumers and civil society networks are not involved in the cluster activities.

Involvement of civil society organisations (public participation)

Consumers and civil society networks are not involved in the cluster activities.

21.2.7. Cluster's Mission towards Sustainability

Are sustainability aspects considered in the cluster's strategy? Are the three dimensions of the sustainability (environmental, social and economic) equally considered? If no, which dimension is less/more important for the cluster?

BBA fosters start-ups and ideas that are sustainable environmentally, socially and economically. The Blue Bio Value acceleration programme, selects those start-ups that substitute a fossil fuel or less sustainable product/application. For example, the 2018 winner of the acceleration programme, B'ZEOS, is a startup striving to replace plastic with material made of seaweed (mainly algae). The first product this group has developed is a biodegradable and edible drinking straw that contains no sugar.

Is the focus of sustainability placed at the regional level or at the international level (e.g. "Not in my Backyard" issues vs. impacts of biomass production in developing countries)?

The main tools for concretely promoting and enhancing sustainability (the Blue Bio Value and the Blue Bio Network) are oriented towards national and international companies, providing them with legal and upscaling support from national organisations and companies (the members of Blue Bio Alliance).

21.3. Synthesis: Existing Challenges

What are the main problems/challenges experienced according to relevant actors (e.g. related to funding instruments, support mechanisms, policy framework conditions, network facilitation, etc.)?

The cluster has encountered challenges encouraging research institutions to disseminate research outcomes and findings for these to have greater impact and possibly be applied by non-academic actors.

A major barrier is the lack in cluster membership of actors at the end of the value chain - big consumer companies and big retailers

22. NATIONAL PLATFORM AGROBIOFOOD NITRA

Author: Eduard Miskuf (PEDAL)

22.1. Description of the Cluster⁹⁷

The establishment of the National platform AgroBioFood Nitra⁹⁸ was one of the first steps to present Slovakia to the consortium Food, Nutrition and Health Research Infrastructure (FNHRI). Its objective is to create research infrastructure in the field of nutrition, food systems and health care system in relation to the consumer and health.

22.1.1. Location

Establishment of the platform was one of the first steps in the Slovak Republic's entry into the field of biotechnology foodstuffs. The platform is the country's national node and official representative of the Slovak Republic in terms of European and international initiatives in this field.

Slovak University of Agriculture in Nitra (SUA in Nitra), the responsible institution of the platform, is located in the western part of the Slovak Republic, in the city of Nitra, which is the most fertile part of the country (Danubian lowland). Nitra is situated at the foot of Zobor Mountain, in the valley of the river Nitra. It is the fifth-largest city and also one of the oldest cities in the Slovak Republic. However, the platform is not restricted to any particular region.

22.1.2. Relevant Biomass Supply

The platform does not focus on any specific biomass supply, but rather on research infrastructure along the food system as well as plant, animal and microbial biotechnology.

22.1.3. Relevant Bioeconomy Sector(s)

Mainly food production (including bakery products, dairy and meat products, honey and bee products, beverages, malting and brewing technologies, winemaking and other). Members are intensely focused on research, project management, data collection, technology transfer management and similar supportive activities, reflecting the overall focus of the platform on research.

22.1.4. History of the Platform

The national platform AgroBioFood Nitra was set up in 2016 by the Memorandum of Cooperation concluded between the Slovak University of Agriculture in Nitra, National Agricultural and Food Centre based in Lužianky and Bioeconomy Cluster based in Nitra, supporting the establishment of cooperation entities within the knowledge triangle - the aim is to link education, research and business. The platform was supported by the Ministry of Education, Science, Research and Sport of the Slovak Republic, which recognises it as an expert partner for R&D in the field of foodstuffs and biotechnology.

⁹⁷ The information provided is based on an interview with the cluster representative, unless indicated otherwise.

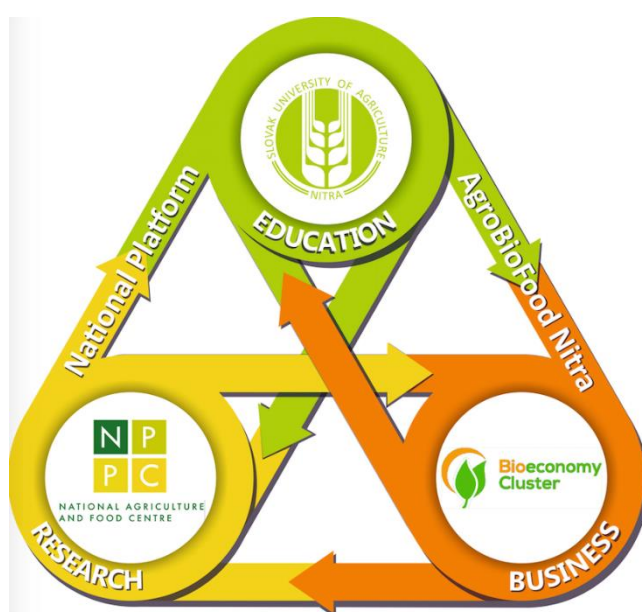
⁹⁸ <http://www.uniag.sk/en/national-platform-agrobiofood/>

22.1.5. (Inter)National Strategies and Cooperation

Members of the platform regularly attend national and international conferences, workshops and project meetings in order to promote networking and further cooperation. Platform representatives meet once a month to get information about calls, conferences, initiatives, projects, and consortia.

22.2. Current Situation

22.2.1. Main Actors



Slovak University of Agriculture in Nitra is the only agricultural university in the Slovak Republic and it is consistently ranked highly for the quality of its teaching and research in the Slovak Republic. The University has carried out concentrated innovative and interdisciplinary research in food areas towards new methods and procedures in research through its six faculties, including the Faculty of Biotechnology and Food Sciences (FBP since 2002), the AgroBioTech Research Centre Source: Interview partner (since 2015), and the Transfer Centre. Especially in applied research, with the possibility of transferring results into practice, the goal is to achieve biological

and technological integrity of the "agricultural product – food" system. The Transfer Centre cooperates with

the agri-food sector by popularising and commercialising science and research results, intellectual property protection, support for start-up and spin-off establishment, and international cooperation. The main activities of the Transfer Centre are monitoring the needs of the agri-food sector, supporting university-business cooperation, establishing food incubators, providing research and expertise, as well as legal support and consultancy in the field of patenting and licensing. SUA cultivates close and productive links with its local and regional community and will continue to expand its work at the international level in both teaching and scientific research. It has a strong tradition of working in collaboration with business and industry, and of playing an active role in economic regeneration.

The National Agricultural and Food Centre (NAFC) is a unique sectoral research organisation under the Slovak Republic's Ministry of Agriculture and Rural Development, bringing together seven independent research institutes into one comprehensive research and innovation centre. The Centre conducts comprehensive research in the agri-food sector and gathers knowledge about sustainable use and protection of natural resources. In the latter it focuses on soil and water resources for crop production and animal husbandry, food quality and safety, innovation and competitiveness of food and non-food products of agricultural origin, productive and non-productive impact of agriculture on the environment, rural development,

and the transfer of knowledge from agricultural and food researchers to end users. The NAFC has know-how and technologies to develop optimised practical applications.

Bioeconomy Cluster (BEC) is an association of legal entities (since 2015). It promotes cooperation in the field of innovation, and coordinates the exchange of information among its members: entrepreneurs (agricultural and food enterprises), R&D representatives, universities, and representatives of local and regional governments. The Cluster focuses on building innovation partnerships in the food industry and networking among various cluster members, particularly small and medium-sized enterprises in the research and development sphere. The cluster's main objectives are exploring funding opportunities and financial tools for members, as well as internationalising its membership.

22.2.2. Current Mission and Objectives

National platform AgroBioFood Nitra aims to interconnect entities from education, research and business so as to foster development, innovation and knowledge transfer. Key scientific focus areas are food design and innovation, personal nutrition and health, food quality and safety, DNA techniques, as well as, biotechnology and engineering. The platform deals with all areas of food science, including food chemistry, food microbiology, technology and food analysis.

The platform's mission is to find a comprehensive solution to nutrition and food quality problems in Europe, recognising them as basic public health factors. It applies a comprehensive systemic approach to nutrition and to the definition of nutritional requirements for foodstuffs through objective control methods. Its research is aimed at defining nutritional doses, creating models for personal nutrition, developing foods with higher added value, and reducing waste throughout the food production chain in line with concept of a circular economy.

The Food Incubator supports companies' regional development with an emphasis on innovation and use of the know-how created at the university. It supports the university's activities in commercialisation of intellectual property. Services offered include shared space, research on consumer behaviour in the grocery market, marketing, monitoring and technology solutions at the university, presentations of technologies and technology solutions, business advice, and business plan evaluation. Applicable infrastructure includes specific technologies for food production (heat treatment processes, sterilisation, pasteurisation, other preservation processes, food safety technologies, packaging technology, etc.). The Food Incubator plans to carry out processing of cereals and other edible plant-based raw materials (especially fruit and vegetables), processing of animal foodstuffs, food sensory analysis, and food packaging. Physical infrastructure, including laboratory and research space, will be provided to the team that demonstrates results in line with a focus on smart specialisation.

22.2.3. Current Role and Importance (Function) of the Main Actors

- Educational organisations (represented through the SUA)
- R&D institutes and organisations (represented through the NAFC)
- Entrepreneurs, including large-scale industries and small and medium enterprises (represented through the BEC)
- Biomass producers, including associations (represented through the BEC)

22.2.4. Good Governance

The mission of the National Platform AgroBioFood Nitra is:

- addressing the societal challenges of food system and biotechnology through innovation within the knowledge triangle
- coordinated approach to the implementation of activities leading to involvement of the platform in international projects, consortia and other innovation structures
- engaging in HORIZON 2020, Interreg Europe, COST, International Visegrad Fund, Erasmus+ and other programmes
- promoting cooperation between national and international centres of excellence
- connecting stakeholders with cutting-edge research and education
- transferring knowledge into practice
- involving consumers and consumer associations through events (e.g. public workshops, professional courses, trainings, summer and winter schools, networking events and conferences)

22.2.5. Cluster's Mission towards Sustainability

Are sustainability aspects considered in the cluster's strategy?

Partly. The cluster's objective is to create research infrastructure in the field of nutrition, food systems and health care systems in relation to the consumer and health.

Are the three dimensions of the sustainability (environmental, social and economic) equally considered? If no, which dimension is less/more important for the cluster?

Yes: research on food systems, nutrition, and health are directly related to both the environmental and social aspects of sustainability. The economic aspect is reflected e.g. in the regular meetings of platform representatives concerning relevant calls.

Is the focus of sustainability placed at the regional level or at the international level (e.g. "Not in my Backyard" issues vs. impacts of biomass production in developing countries)?

National level

22.3. Synthesis: Existing Challenges

What are the main problems/challenges according to relevant actors (e.g. related to funding instruments, support mechanisms, policy framework conditions, network facilitation, etc.)?

Policy framework conditions are not conducive to stopping environmental degradation and introducing sustainable land management.

More information and contact details:

<http://www.uniag.sk/en/national-platform-agrobiofood/>

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23. BIOECONOMY CLUSTER (BEC)

Author: Eduard Miskuf (PEDAL)

23.1. Description of the Cluster⁹⁹

Bioeconomy Cluster (BEC)¹⁰⁰ is an association of legal entities established in 2015 to promote cooperation in the field of innovation and mutual exchange of information between cluster members which mainly includes representatives of the business sector (agricultural farms and food processors), R&D actors, academia, regional and local governments as well as tertiary sphere.

23.1.1. Location

The bioeconomy cluster is headquartered in the city of Nitra in western Slovakia, which is the most fertile part of the country (Danubian lowland). Cluster members hail from all over the country.

23.1.2. Relevant Biomass Supply

The cluster does not focus on any specific supply of biomass.

23.1.3. Relevant Bioeconomy Sector(s)

Most members are from the agricultural and food sectors.

23.1.4. History of the Bioeconomy Cluster

The Bioeconomy Cluster (BEC) was founded in December 2015 after long-term engagement of its representatives in European and national policies in the area of agriculture and food. Various representatives had also been involved in supporting small and medium enterprises, as well as in connecting the entities of the knowledge triangle.

23.1.5. (Inter)National Strategies and Cooperation

The cluster and its members have competencies and experience in implementing national and international projects (EU Framework Programs, European Territorial Cooperation Programs, International Visegrad Fund, Structural Funds, etc.). The Bioeconomy Cluster has experience with participation in working groups and in monitoring committees at EU and national level.

In order to express the current position of the cluster in relation to the international environment and to set goals for future international cooperation, the cluster developed an internationalization strategy. The cluster is always looking for new topics to discuss and new ways to develop the bioeconomy sector in Slovakia. In this regard, the BEC elaborated a strategy for development of intelligent bioeconomy, which deals with the application of digitalisation in various bioeconomy sectors.

23.2. Current Situation

RIS3 – the future of research and innovation in the EU

⁹⁹ The information provided is based on an interview with the cluster representative, unless indicated otherwise.

¹⁰⁰ <http://bioeconomy.sk/en/>

In June 2017, the Slovak Government Council for Science, Technology and Innovation approved the RIS3 Implementation Plan, which defined five domains of smart specialisation for the Operational Program Research and Innovation. The topic of organic agriculture is partly reflected in the "Healthy Food and Environment" domain. The domain is focused on innovation and the competitiveness of the agro-sector, food and forestry. BEC representatives were active members of the RIS3 Working Group within the domain.

National Platform AgroBioFood Nitra

The BEC contributed to the establishment of the AgroBioFood Nitra National Platform on the basis of a Memorandum of Understanding signed by BEC, the Slovak Agricultural University in Nitra, and the National Agricultural and Food Centre. The platform was accepted by the Ministry of Education, Science, Research and Sport of the Slovak Republic as an expert partner for food and biotechnology research and development, and as an official representative of the Slovak Republic in relation to European and international initiatives and programmes. Platform members meet and discuss opportunities to engage in international challenges and projects. One of these options is the emerging PROSPECT project under the Food and Nutrition and Research Infrastructure (FNH-RI). FNH-RI is a joint and unique initiative of six countries (the Netherlands, Denmark, Italy, Great Britain, France and Slovakia), which has the ambition to become part of the European Strategy Forum on Research Infrastructures (ESFRI). ESFRI is an advisory body of the European Commission and has developed a strategic paper ("ESFRI Roadmap") covering a range of topics including food, health, environment, and energy.

SCAR Bioeconomy – a path to a strategy on organic farming in Slovakia

BEC representatives are part of the Strategic Working Group on Bioeconomy, established within the Standing Committee on Agricultural Research (SCAR). This working group discusses and prepares materials at European level to promote sustainable production of renewable bio-resources for the bio-economy. The BEC is the only Slovakian representative in this working group.

Thematic Group – Mainstreaming the Bioeconomy

The BEC is a member of the Thematic Group "Mainstreaming the Bioeconomy". The objective of this group is to encourage the development of sustainable bioeconomy value chains in rural areas, in order to promote employment and economic growth while preserving eco-systems.

The BIOEAST Initiative – so that Central and Eastern Europe is not lagging behind

The BEC also supports the BIOEAST initiative, which is an initiative of Central and Eastern Europe for knowledge-based agriculture, aquaculture and forestry. It provides a common strategic framework for research and innovation aimed at creating a sustainable bio-economy in the countries of Central and Eastern Europe. In particular, the aim is to harmonise research and innovation across all parts of Europe, to develop excellence in research, and thus increase participation of operators in bio-based industries in Horizon 2020 projects.

PA8 Danube Strategy – learning new European policies

BEC representatives are also members of the Steering Committee of Priority Area 8 of the Danube Strategy – Competitiveness and Cluster Development. They regularly attend the committee meetings and the annual forums of the EU Danube Region Strategy, where they have the opportunity to exchange views and experiences with partners from the Danube

Region. Indeed, the long-built trust and contacts gained under the Danube Strategy enabled BEC to successfully engage in international projects.

Implementation of projects

The BEC is currently involved in the Danube S3 Cluster project (Danube Transnational Programme) aimed at improving cooperation and coordination of cluster policies in the agri-food sector, based on the smart specialisation approach, developing the Danube S3 Cluster Strategy and Programme based on quadruple helix involvement, and exploiting linkages between mutually-reinforcing specialisation areas across the sectors.

23.2.1. Main Actors

The main actors in the cluster include research centres, the agricultural university, as well as small and medium enterprises operating in the agriculture, food, and forestry sectors. Other parts of the bioeconomy are also represented, including eco-construction, bio-polymers, and the phytopharmaceutical industry.

23.2.2. Current Mission and Objectives

Since the bioeconomy is a very complex topic, the cluster deals not only with agriculture, but also with cross-cutting, inter-sectoral topics and cooperation (energy, waste and environment, but also ICT, plastics, engineering, etc.).

The cluster's main goal is to work with the practitioners (industry) and to combine practice with science and research. In this respect, the cluster ensures representation of its members, promotes mutual cooperation and common interests. Members are represented by organisations with which the cluster cooperates in supporting development of the bioeconomy sector in Slovakia.

23.2.3. Current Role and Importance (Function) of the Main Actors

- Entrepreneurs, including large-scale industries and small and medium enterprises
- Policy-makers and supportive bodies
- Bioeconomy R&D institutes and educational organisations
- Brand owners
- Biomass producers, including associations

23.2.4. Legislative Support Mechanisms

- ERDF: Interreg Danube Transnational Programme

23.2.5. Cluster's Mission towards Sustainability

Are sustainability aspects considered in the cluster's strategy?

Yes. The BEC would like to initiate creation of national bioeconomy strategy which does not exist in Slovakia for now, and to contribute to this strategy.

Are the three dimensions of the sustainability (environmental, social and economic) equally considered? If no, which dimension is less/more important for the cluster?

Yes. Promoting innovation and cooperation among BEC members and other partners supports all the three sustainability aspects.

Is the focus of sustainability placed at the regional level or at the international level (e.g. “Not in my Backyard” issues vs. impacts of biomass production in developing countries)?

Mainly national level.

23.3. Synthesis: Existing Challenges

What are the main problems/challenges experienced according to relevant actors (e.g. related to funding instruments, support mechanisms, policy framework conditions, network facilitation, etc.)?

- The fact that Slovakia lacks a bioeconomy strategy is a challenge
- No cluster policies are available in Slovakia
- Cross-sectoral challenges – linking bioeconomy with other sectors and industries (e.g. ICT, plastic industry, automotive industry, etc.), promotion of cross-sectoral cooperation
- The multi-actor approach – it is a challenge to involve different types of stakeholders in the dialogue, incl. businesses, policy-makers, R&D, academia, and civil society
- International cooperation – it has been challenging to strengthen international cooperation, involvement in international projects, improve visibility and “brand” the cluster at international level

24. AGRIFOOD CAMPUS OF INTERNATIONAL EXCELLENCE (ceiA3)

Author: Daniel Claudio and Beatriz Palomo (ASEBIO)

24.1. Description of the Cluster¹⁰¹

The Agrifood campus of International Excellence (ceiA3)¹⁰² is a Cluster for agro-food and new bioproducts research. It originated as a joint initiative between the universities of Almeria, Cadiz, Huelva and Jaen, headed by the University of Cordoba with the purpose of bringing their knowledge about the agrifood industry at the disposal of society and contribute to the development of this sector, addressing key agricultural challenges of 21st century.

24.1.1. Location

The campus of international excellence in agro-food (ceiA3) involves the Universities of Almeria, Cadiz, Huelva and Jaen, led by the University of Cordoba. These five institutions in Spain's Andalusia region contribute scientific advances in the agri-food sector to companies and society at large - the results of the scientific work done under the auspices of ceiA3 involves more than 200 individual research teams.

Universidades de Andalucía



Source: [Own work](#)

24.1.2. History of the Bioeconomy Cluster

The ceiA3 is made up of five Andalusian universities (Almeria, Cadiz, Cordoba, Huelva and Jaen), the Andalusian Institute for Agricultural and Fisheries Research and Formation (IFAPA), and the Spanish National Research Council (CSIC).

Other participants in the ceiA3 include companies and scientific organisations that cooperate with the cluster. Research done under the auspices of the ceiA3 focuses on:

- improvement and optimisation of production resources
- soil conservation and fertility

¹⁰¹ The information provided is based on an interview with the cluster representative, unless indicated otherwise.

¹⁰² <http://www.ceia3.es/en>

- waste management
- innovative solutions based on biotechnology

24.2. Current Situation

The main objective of ceiA3 is to promote the participation of university research groups in European and International research, development and innovation projects and actions. The cluster also promotes innovation, technology transfer and the promotion of the participation of agri-food companies in R&D projects. The cluster provides services to its members, including:

- advice on finding and preparing proposals for European and international projects
- representation of the interests of researchers and companies before European institutions and international organisations
- support in the search for corporate funding

The centre seeks to establish itself as a global benchmark in agrifood research, and is thus part of several international networks and European conventions.

The cluster does not promote specific products, but participates in projects. The ceiA3 currently leads the Spanish hub of the Europe-wide **BLOOM project**, whose main objective is to create hubs boosting citizen awareness of the bioeconomy in different EU regions. The hubs are led by consortium partners who invite and involve network partners and other bioeconomy stakeholders. Together, they build working teams that develop outreach activities and materials to strengthen increased public engagement in the bioeconomy.

24.2.1. Current Role and Importance (Function) of the Main Actors

The ceiA3 offers 31 programs for scientific learning, which are aimed at the specialisation in agro-food biotechnology and are directed by prestigious scientists. The doctoral programs of ceiA3 are focused on international development through the European and American networks available to the centre.

More than 280 ceiA3 scientific groups cover all fields related to agri-food biotechnology, bioprocesses, bio-based products research, soil conservation and improvement, innovative solutions based on biotechnology.

24.2.2. Legislative Support Mechanisms

The ceiA3 participated in the elaboration of the **Andalusian bioeconomy strategy**, which was published in September 2018. Andalusia is one of the regions with the greatest potential to boost the Spanish bioeconomy, due to its environmental conditions and agroforestry sector companies. Objectives of the Andalusian bioeconomy strategy include:

- improving sustainability and competitiveness of the agri-food sector, and forestry by encouraging the use of innovative practices that favour a circular economy;
- boost the competitiveness of industries working with biological resources
- encourage the reuse of resources, water, gases, nutrients and the use of vegetable waste and residues to obtain other products, uses, or energy
- favour research, innovation and skills related to the development of bioeconomies

- strengthen inter-administrative coordination and synergies with other programmes of work in different fields¹⁰³.

24.2.3. Good Governance

The ceiA3 is run by a governing council, which approves strategic decisions and is made up of rectors from the five universities. The ceiA3 also includes a scientific council, an international advisory council and advisory commissions.

The cluster continuously interacts with civil society through training programmes for students, and with companies (who are its users) and researchers.

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https://www.juntadeandalucia.es/export/drupaljda/Estrategia_Andaluza_Bioeconomia_Circular_EABC_18.09.2018.pdf

25. INTERPLATFORM GROUP OF CIRCULAR ECONOMY

Authors: Daniel Claudio and Beatriz Palomo (ASEBIO)

25.1. Description of the Cluster¹⁰⁴

The Interplatform group of circular economy is a working group that brings together Spanish technology platforms and makes them cooperate in the circular economy.

The group is located in Spain and is made up of 23 Spanish technology platforms that represent all sectors of the bioeconomy and operate throughout the country.

There are six promoters' platforms: Planeta, SusChem-España, Food for Life Spain, PTE del Agua, and PLATEA y MANU-KET. These are responsible for publicising activities and controlling funding of the group.

This cluster is aimed at exploiting the potential of innovation to promote applications of the circular economy concept in productive sectors operating in the bioeconomy, as well as contributing to the implementation of national and European strategies in this field.

25.1.1. History of the Cluster

The Interplatform Group of Circular Economy was created in June 2014 by the six Spanish technological platforms listed above with the following objectives:

- identify opportunities for moving towards an efficient use of resources in industry as well as for implementing circular economy models in Spain's industrial sectors
- promote national and international research, development, and innovation projects for technologies, processes and instruments that use resources efficiently and implement circular economy models in industrial sectors

The Technology Platforms are public-private structures led by industry.

They lead joint activities aimed at identifying project and business opportunities across their membership.

25.2. Current Situation

The cluster is made up of 23 Spanish technology platforms, covering strategic sectors for the circular economy and bioeconomy.

The activities of the interplatform group are mainly aimed at stimulating initiatives and actions for public-private collaboration in the field of research and innovation, as well as supporting projects in the framework of research, development, and innovation programmes both national and international.

In recent years, the group has developed activities aimed at generating knowledge around the circular economy by participating in forums and conferences. These activities are:

¹⁰⁴ The information provided is based on an interview with the cluster representative, unless indicated otherwise.

- promote the instruments of financing for research, development, and innovation in the circular economy
- present success cases in circular economy and bioeconomy
- facilitate connections among key actors in different value chains

The cluster's product "Connecting for a Circular Economy", an online tool that allows users to publish and search for information on valuable waste and/or by-products generated by users in other productive sectors, is currently available and continues to be used by the relevant stakeholders. The tool puts actors that can form part of the value chain of these recoverable wastes in touch with each other. It also provides information on suppliers of technologies aimed at the recovery and reuse of waste.

The cluster collaborates with a Spanish non-profit organisation that promotes the exchange of knowledge in pursuit of sustainable development (CONAMA) in its annual Congress for the organisation of business-to-business meetings, and in preparing circular economy workshops.

25.2.1. Current Role and Importance (Function) of the Main Actors

The group currently consists of 23 technology platforms, which are groups of public-private entities of a particular sector led by industry, and are linked by a strategic research agenda.

These technological platforms are recognised by the Spanish government and the European Commission. All Platforms have contacts with their European counterparts and participate in the working groups of corresponding European platforms.

The main actors of the bioeconomy environment include BIOPLAT (Biomass Platform), BIOVEGEN (Plant Biotechnology Platform), MANU-KET (Advanced Manufacturing Platform), the Biotechnology Markets Platform, PACKNET (Packaging Platform), PTEA (Water Platform), SUSCHEM (Chemistry Platform), Food for Life (Food Platform), PTV (Wine Platform), Logistop (Logistics Platform), and ThinkTur (Tourism Platform).

25.2.2. Legislative Support Mechanisms

Several members of the cluster participated in the elaboration of the Spanish Bioeconomy Strategy, and the whole cluster is participating in the country's Circular Economy Strategy that has not been launched yet. Comments for improving the Circular Economy Strategy were sent to the relevant Ministries in March of 2018).

25.2.3. Good Governance

The group has encouraged public-private participation around the circular economy. As well as encouraging the participation of all agents (administration, business, etc.) in the various actions.

In addition, the group's platforms have a special participation in the Spanish Bioeconomy Strategy and Circular Economy Strategy. Participating in the design of the strategy, as well as in various actions that are detailed within the strategy, these platforms being fundamental to promote public-private cooperation.

ANNEX II – Implementation Guidelines

ASPECTS TO BE COVERED IN THE CASE STUDY NARRATIVES

1. Selection of the bioeconomy sector(s) in the case study region and stage of development
 - Location
 - Relevant biomass supply
 - Relevant bioeconomy sector(s)
2. History of the bioeconomy cluster
 - When established and the main actors (entrepreneurs, policy-makers, knowledge institutes)?
 - Initial mission and objectives
 - (Inter)National strategies and cooperation
3. Current situation
 - Main actors
 - Current mission and objectives
 - Main competitive products and stage of development
4. Current role and importance (function) of the main actors
 - Entrepreneurs, including large-scale industries and small and medium enterprises
 - Policy-makers and supportive bodies
 - Bioeconomy R&D institutes and educational organizations
 - Consumers and civil society networks
 - Brand owners
 - Biomass producers, incl. associations
 - If some of the main actors are absent, why is that? Are there difficulties of involving certain actors?
5. Legislative support mechanisms
 - National or regional instruments that support the development of the cluster, e.g. smart specialisation strategies
 - Other policies and measures at national and regional level to support bio-based businesses and facilitate multi-stakeholder and cross-sector cooperation
 - Funding instruments, including ERDF
 - (Inter)National strategies and cooperation
6. Good governance
 - Involvement of consumers and consumer associations (public participation)
 - Involvement of civil society organisations (public participation)
7. Cluster's mission towards sustainability
 - Are sustainability aspects considered in the cluster's strategy?

- Are the three dimensions of the sustainability (environmental, social and economic) equally considered? If no, which dimension is less/more important for the cluster?
- Is the focus of sustainability placed at the regional level or at the international level (e.g. “Not in my Backyard” issues vs. impacts of biomass production in developing countries)?

8. Synthesis: existing challenges

- What are the main problems/challenges experienced according to relevant actors (e.g. related to funding instruments, support mechanisms, policy framework conditions, network facilitation, etc.)?

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