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D2.3 - Report on the assessment of local needs, conditions, opportunities

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List of abbreviations:

SRIP	Strategic Research and Innovation Plan
EIT	The European Institute of Innovation and Technology
R&D	Research and experimental development
GVA	Gross Value Added
SMEs	Small and Midsize Enterprises
LAG	Local action groups
NEET	Not engaged in education, employment or training
IT	Information technology
AROPE	At risk of poverty or social exclusion
EU	European Union
ICT	Information and communication technology
RM	Rom minority
B2B	Business to business
TRL	Technology Readiness Levels
SURE	Sustainable Resources Verification Scheme
RDI	Research, development and innovation

1. Introduction

New strategies are essential to address rural areas depopulation, climate change impacts, resources scarcity, deeper social inequalities, etc. and to become a more resilient society. In addition, strategies and policies design should align mitigation measures with the local specificities which could play a key role hindering the successful deployment of these measures and initiatives at local level. In fact, the more tailored the strategies, considering the needs of each region, the more likely they are to be successfully implement and efficient to reach their goal. Furthermore, efforts should be allocated to find a suitable and effective combination of social and environmental objectives while considering the economic dimension.

Supporting and guiding selected regions in the evaluation of their full bio-based value chains potential and most relevant factors that could affect the deployment of these initiatives is essential to identify the most suitable actions in each case and build a successful strategy. Additionally, the assessment of the similarities and differences can significantly contribute to tailor the approach. Lastly and most important the multi-actor approach is key to reach a successful implementation.
The aim of BIOLOC project is to promote bio-based value chains and circular bioeconomy strategies which in turn will contribute to revitalise rural areas while playing a part on building a more inclusive society for the social marginalized groups. Therefore, a special emphasis is placed on social marginalized groups.

Overall, the work developed in WP2, aims to collect data that will be useful as input data for other actions envisaged in the project. More specifically, it aims to contribute to WP3 focused on the development of a catalogue of biobased solutions and good practice examples by pointing put most relevant value chains in the regions. But mainly the input data reported is devoted to contributing to WP4 which focuses on oriented business models, governance and local capacity building but also to WP5 that will support the development of regional hubs contributing to the deployment of bio-based solutions for the revitalization of local communities.

In this work line, task 2.3 aims to collect the information to identify the weaknesses, strengths, opportunities and threats at regional level that will enable to design tailored strategies and recommendations to further promote bio-based value chains and the development of hubs and therefore deliver key information for the bioeconomy promotion strategy development. Furthermore, the work carried out in this task implies collecting the feedback from key actors at regional level while task 2.2 mainly involved a data collection process carried out by the regional partner involved in the project and literature review.

2. Data collection process

This SWOT analysis is a methodology used to identify Strengths, Weaknesses, Opportunities and Threats of each region. In order to analyse the situation of each region, the steps carried out were as follows:

1. A videoconference with the regional partner was held to explain the main objectives, the methodology used to collect the information, the actions foreseen (workshops) as well as the materials provided. In this sense, a list of potential strengths, weaknesses, opportunities, and threats was shared to be used as starting point to initiate the discussion with the target groups (target audience) invited to the workshop.
2. Once the workshops were performed and the data collected according to the instructions provided, CIRCE analyzed the information compiled and reported the outcomes and conclusions extracted. This information was reviewed by the regional partners and the suggestions addressed when needed to finalize the document.

It is worth noting that for some regions it was easier to organize a workshop inviting all the stakeholders from the target groups and for other the strategy was adapted to perform individual interviews with each target group considering the actors preferences.

The objectives, aspects to consider, and general guidelines were discussed during the telcos held with the regional partners although individual telcos were also organized with the regions that requested additional support to plan the activity. Two templates were provided, one in excel file format and the other in PowerPoint to be used to collect the information more easily during the workshop. Additionally, a preliminary list of potential weaknesses, strengths, opportunities, and threats were provided although each region was asked to adapt the initial list to select the aspect that apply in each region. These initial list of strengths, opportunities, weaknesses, and threats were discussed with the different stakeholders' groups targeted in the regional context to confirm their applicability in the region and add missing aspects when needed. The templates are included in Annex I. The conclusions extracted were used in the workshop planned jointly with Task 5.3 as starting point of the discussion to identify potential initiatives in the region.

3. Regional SWOTs analysis

As was mentioned in the previous chapter, a SWOT analysis is a strategic analysis tool for use in a context analysis. It combines an assessment of the strengths and weaknesses of an organisation,

geographical area as in BIOLOC project (region) or sector with the assessment of the opportunities and threats posed by the environment.

The outcomes of the SWOT analysis can be used for many purposes during implementation of the BIOLOC project (e.g. to make strategic choices if changes in the context are identified) or evaluation to ensure that the implemented strategy (bioeconomy promotion strategy to be developed) is appropriate to the situation described in the analysis.

The final list of strengths, opportunities, weaknesses, and threats by region are depicted in the following sections.

3.1.Italy, Campania region SWOT

STRENGTHS

- Large forest and agricultural areas
- Large share of population is located in rural areas
- Large number of agroindustries are looking for alternatives to valorise by-products and companies are looking for diversifying the product offer (agroindustries, chemical, biomaterials, etc.)
- Tradition in the agri-food sector
- Available finances for spin-offs and start-ups
- High amount of potential biomass across various sectors

WEAKNESSES

- Low market relevance of bio-based products
- High rate of unemployment (19.7%)
- Lack of workforce with skills and know-how
- Lack of infrastructures, especially transformation and valorisation technologies
- Underestimation of bioeconomy potential in the region by the regional authorities
- Lack of policy support
- It requires a long time to recover the investment in bio-based initiatives.
- Educational initiatives are limited
- Heavy bureaucracy

OPPORTUNITIES

- Under-used biomass could have great potential
- There are succesful cases of bio-ased value chains in the region or in neighbour regions
- Inclusion of local small-scale producers and farmers
- European funding opportunities
- Available access to funding for SME´s
- Rich diversity of natural resources in the region
- New job opportunities
- New connections are being stablished
- Exploring various financing approaches
- Actives associations are representing targeted social marginalised groups
- Utilization of waste material is being enhanced

THREATS
▪ Adverse effects of climate change on biomass yields ▪ Lack of commonly agreed and global assessment tools ▪ Low public support to marginalised groups and small farmers ▪ Lack of lifecycle concept as part of the product development

Table 1. SWOT CAMPANIA REGION, ITALY

In Campania there are large areas of forestry and agriculture land, as well as high availability of biomass which is underused. In addition, agro-industry is an economic sector with a long tradition in the region, which is looking for new value chains, as well as increasing the use of biomass waste. Therefore, here there is an interesting opportunity to promote bioeconomy in the region.

On the other hand, high amount of people is located in rural areas, where the unemployment rate is elevated. In consequence, if education and training programs are promoted, these unemployment people could get a job in new bio-based economical activities. In order to assist these initiatives and encourage different stakeholders to set up new business models related to bioeconomy, public support is essential, especially focus on marginalised groups and farmers.

3.2.Czech Republic, Moravian-Silesian region SWOT

STRENGTHS

- Just Transition Funding Region devoted to former mining and heavy industry
- Established networks to support research and business cooperation -AVO network BIOEAST HUB CR MS Region, clusters, platforms
- Strong R&D infrastructure: regional R&D Centre focused on energy and EU excellent centre (laser technology)
- Large experience in technology transfer (AVO members, VSB - Technological university Ostrava) and also international projects INTERREG EUROPE - SKILLS (IT), RURES (bio-based solutions)
- Rather good infrastructure of biogas stations
- Good transport network

WEAKNESSES

- Lack of lifecycle concept as part of the product development
- Low awareness about bioeconomy in general
- Lack of skilled workforce (high unemployment rate, especially among young people)
- Lack of incentives
- Lack of infrastructures (transformation/valorisation technologies)
- Polluted ecosystem as an industrial "heritage" (JTF region)
- Cost of feedstocks too high

OPPORTUNITIES

- Cooperation established with Poland and Slovakia regions (TRITIA region)
- A large share of the population located in rural areas
- Bio-based solutions and value chains deployment could be built on the R&D projects (biogas enrichment, composting technologies, pyrolysis units)
- Availability of public funding for research and development

THREATS

- Unfavourable demographic structure, outflow of young and educated people
- Lack of commonly agreed and global assessment tools

Table 2. SWOT MORAVIAN-SILESIAN REGION, CZECH REPUBLIC

Moravskoslezsko has historically been an industrial region, with established infrastructures and a good transport network, suitable for the establishment of potential bio-based industries. However, these traditional industries have been polluting the area and damaging the ecosystem, which in turn could be seeing as an opportunity to develop bio-based initiatives that could use the existent resources in these areas while contributing to reduce the environmental impact.

On the other hand, bioeconomy is not well understood in the region, which makes difficult to establish or promote initiatives in the region. In consequence, campaigns to raise awareness among the general public but also key actors that should be involved in the value chains could be helpful. Also, different initiatives promoted by the local authorities such as workshops could be seen as an opportunity to seek for synergies among different stakeholders (industries, farmers, NGO´s, etc.) and establish a collaborative framework.

This region has experienced on how to transfer technology and how to support business and research cooperation. Therefore, based in this background, new initiatives such as biogas, composting technologies or pyrolysis, among others, can be promoted in the area. Moreover, although there is an available workforce, most of the population and specially targeted marginalized group have not experience in this topic. Additionally, young people are migrating from rural areas looking for new opportunities. In consequence, providing knowledge and training programs could significantly contribute to attract population to rural areas.

3.3. Romania, West region SWOT

STRENGTHS

- Strategic position of the West region on the border, close to the Central European states
- Fertile soil which leads to high productivity per hectare which in turn can contribute to develop economic activities based on biomass production
- Farmers and businessmen in the Western Region with significant agricultural potential have started to be interested in the bioeconomy domain
- Wide variety of natural resources and bioresources that can be exploited sustainably (e.g., thermal water, woodlands, agricultural lands, animal sector)
- Existence of universities with knowhow and expertise on solutions regarding the circular bioeconomy (e.g., University of Life Sciences, Polytechnic from Timisoara, Babes Bolyai Centre from Reșița)
- Average educational level is high school and bachelor
- The age structure reflects that the young population is predominant
- Rate of risk of poverty or social exclusion (AROPE) is lower than in other regions
- Currently a trend toward decreasing waste is growing in the region
- Increasing incomes growth which can ensure the opening of new companies (e.g. in circular bioeconomy area)
- High value of labour productivity (2nd place in the country)
- Several initiatives and companies related to circular bioeconomy have been developed in the region (e.g., biogas, vermicompost, sustainable food processing)
- Significant diversity of business sectors (very good aspect for openness in developing new companies in the circular bioeconomy area)
- Relevant clusters in the West Region (automotive, ICT, energy)
- Research sector is well developed
- Increase of technological transfer units due to European investments

WEAKNESSES

- Major pollution sources in the area (former steel and metallurgical centres, city power plants like for instance fossil fuel and thermal power plants and tailings dumps) and polluting sites (coal, different ores)
- Low unemployment makes the region unattractive for opening new businesses
- Absence of a strategy to use thermal waters on a large scale
- Fossil based resources cannot be exploited sustainably (coal, oil)
- Poorly treatments of wastewaters determine water pollution
- Large number of waste collection centres that do not comply with EU requirements
- Reduced number of medium-sized enterprises
- Lifelong learning ranks last in the country and this aspect could negatively influence the openness to learn new abilities (e.g., new skills in circular bioeconomy)

- High level of NEETs
- Weak participation of the academic environment in the development and innovation centres
- Small number of large companies involved in processing agricultural products (or agricultural residues for circular bioeconomy)
- Low survival rate of companies: a third of them disappear in the first year of operation
- Small number of enterprises active in the bioeconomy field
- Reduced number of energy-efficiency homes
- Increasing area of degraded lands

OPPORTUNITIES

- Attracting investors to offer jobs to people at risk
- Possibility of exploiting uncultivated land due to agricultural overproduction and degraded land (biomass represents a chance for economic recovery for rural development)
- developing bio-based initiatives in which farmers or rural investors get involved to promote circular bioeconomy can contribute to make local farms or small industries more competitive while also increasing its sustainability
- Employment rate in rural areas is only 23-25%
- Multiplication of examples of good practices in the field of circular bioeconomy
- Harnessing the energy potential of the area focusing on renewable energy sources (biomass, geothermal, water and solar)
- Creation of waste collection centres to enable waste valorisation (e.g., wool, vegetal and animal farms, organic waste management, etc.)
- Converting the current energy production systems to renewable resources
- Development of new skills to produce renewable energy from energy crop biomass or agricultural crop by-products
- Development of niche industrial branches adapted to local specifics (e.g., soil rehabilitation&health)
- Development of clusters in fields with a strong innovation vision
- Stimulation of applied research and reinforce the link with market requirements (e.g., management of waste sheep wool & soil rehabilitation)
- Establishing a hub for developing partnerships between local authorities-universities-business environment
- - Development of new energy efficiency programs for houses and buildings
- Diversification of economic activities (e.g., circular economy and bioeconomy)
- Training for young people seeking professional reconversion
- Significant gaps in the standard of living between counties (Hunedoara County is the lowest level) could be addressed by developing small enterprises in the circular bioeconomy

THREATS

- Exploration of resources (e.g., forests) is currently unsustainable

- Deepening of the disparities between the mining towns compared to the other towns in the Western region
- Tendency of the population to age sharply which could lead to a lack of workforce available
- Students' migration to universities from abroad
- Increasing threat of human health caused by pollution
- Large number of people employed in the automotive and IT field, not complying with other domains
- Weak relations/cooperation between universities and the economic/market environment
- Areas highly polluted caused by industrial activities impacting human and natural ecosystems

Table 3. SWOT WEST REGION, ROMANIA

The information collected in the SWOT analysis highlights the region´s willingness to develop bioeconomy considering that agriculture producers are engaged on applying good practices, universities are researching and transferring innovation to new companies and the authorities have shown a commitment to increase the renewable energy sources. However, there are some barriers that should be overcame to achieve these objectives, like the need to diversify activities, the bad connection between enterprises and research institutions, and the fact that most companies are SME´s, which makes more difficult to implement innovation technologies because of the lack of funding and reduced investment capacity. The local authorities' support could help to make a collaborative network environment.

Related to the natural resources, there are areas with good soil quality although others are considerably polluted due to the traditional industries activity in the region (automotive, coal industry). This pollution is damaging natural ecosystems and human health and therefore could be a key driver to promote bio-based solutions in the region. Changes in the current practices are therefore needed in order to reduce the emission of contaminants while seeking to promote initiatives to valorise this polluted biomass. Moreover, the current management of residues is not efficient and is not following the European Union requirements, so again the approach should be modified to include new valorisation schemes.

Lastly, it worth to highlight that young people population is predominant in the region, but they are migrating looking for university education abroad. Additionally, the unemployment rate is low. The lack of skilled workforce in the region could affect the new potential bioeconomy jobs created for instance in the renewable energy sector or related to the valorisation of residues. In consequence, it would be interesting to promote an education and training program in the region, aimed at young and people at risk, as well as a campaign to boost the employment and attract skilled labor force to address this drawback.

3.4.Slovakia, Nitra region SWOT

STRENGTHS

- Strong agricultural heritage
- Wide agriculture areas (49% of the Slovakia area is occupied by agricultural land, 0,44ha per capita while in EU it is 0,34ha per capita in average)
- Despite of climate change sufficient water is supplied (1,9 billion cubic metres in dams and 49 774,8 km including the river Danube)
- Availability of human resources
- Existing University and strong research capacities in agriculture
- Leading position of the region in agriculture nationwide
- Tradition in agriculture
- Relatively good industrial infrastructure

WEAKNESSES

- Lack of innovation
- Obsolete technologies applied in agriculture
- Obsolete technologies in the food processing industry
- Obsolete technologies in the wood processing industry
- Lack of possibilities for valorisation of agrifood production in local agrifood industry
- Lack of infrastructures (transformation/valorisation technologies)
- Underestimation of bioeconomy potential of the region by local and national support programmes
- Lack of domestic sales networks
- Extremely low share of domestic food products (40%)

OPPORTUNITIES

- Under-used agricultural areas
- Relatively large share of population located in rural areas
- Existing workforce with potential to be employed by agriculture sector
- Favorable climate
- Good soil quality
- Large cereal production
- Significant opportunities for processing industries (both food and wood processing)

THREATS

- Insufficient subsidies (subsidy per ha or subsidy per product)

- Permanent "investment debt" in the food and wood processing industry
- Disinterest of young people to work in the bioeconomy sector
- Low public support to marginalise groups (small farmers, RM , homeless people)
- Prevalence of machinery and car production
- Competition of foreign agrifood products and wood processing products
- Strong impact of international market chains on market

Table 4. SWOT NITRA REGION, SLOVAKIA

Agriculture is one of the main economic activities in Nitra and this sector counts with the tradition knowledge plus research capacities, as well as natural resources such as water and a good quality soil. However, although there are research organisations in the region, technologies are obsolete in the bio-based sectors and, there is a lack of valorisation value chains. Therefore, public support would help to approach researchers, farmers and bio-based companies, and to increase the technification of the current value chains and to suggest new ones.

Otherwise, in order to maximise the potential of bioeconomy in this region it would be essential to engage the different stakeholders that would play a role on the bio-based value chains deployment, to raise awareness regarding the bioeconomy concept and benefits and design a strategy to promote it. Also, policies and funding programs from the local authorities would contribute to enable the bio-based initiatives implementation. In addition, developing training programs to increase the labour force focusing on young people or people in risk should be considered since it is necessary to train them and make these employments attractive to avoid migration.

Lastly, it worth to highlight that good climate conditions, the availability of water and the good quality of soil represent a significant advantage for the region in order to, become a potential bio-based feedstock provider and potentially bio-based products producer.

3.5.Slovenia SWOT

STRENGTHS

- Diverse and sustainably managed resources in agricultural and forestry production, associated with several ecosystem services, untapped potential for valorization.
- High percentage of forest areas (58% of country area) and the consequent high production potential of Slovenian forests
- Under-exploited flows of residual biomass from (diversified) primary agricultural production and by-products of food production, well-organized organic waste management system
- Bioeconomy is strongly represented in the manufacturing sector (conventional and novel bioeconomy sectors account for 28% of GVA at factor costs)
- Strong manufacturing industry and growing interest of companies to move towards bio-based technologies and to close energy- and resource-based flows, strongly driven on the demand side in the B2B supply segment
- Vibrant enabling environment for supporting start-ups (business incubators, startup accelerators) with an increasing emergence of bioeconomy-related spin-offs based on knowledge generated in (also public) R&D institutions
- Internationally renowned applied research in various technologies of advanced bioeconomy capable of delivering hands-on solutions to industrial clients.
- Established development networks and strategic partnerships linking R&D with the economy and development policy for transitioning into a circular bioeconomy
- Participation of public research organizations in the projects of the leading European platforms and programs, transferring good practices from the EU to the national level
- Stable system of financing for applied research projects based on guidelines garnered from stakeholder initiatives on priority RDI topics
- Growing small and medium-sized enterprise (SME) participation in Horizon 2020, EU networks and bioeconomy related R&D
- Strong strategic commitments for systemic transition to a circular, regenerative, low-carbon economy in Slovenia, inter-ministerial coordination, and international coaching (EIT Climate Deep Demonstration Project)
- Strong policy commitment towards bioeconomy development, reflected in particular in the national Smart specialization strategy, Rural Development policy, partly (support for forest-wood value chain) also in industrial policy
- Networks and partnerships linking RDI with the industry, supported by development policy (Smart Specialisation Strategy - Circular Economy SRIP, PSiDL SRIP, Food SRIP Strategic RRI programs)
- Green public procurement system with its direct and indirect impacts on the demand for bio-based solutions (eg. Incorporation of bio-based construction materials).
- Growing number of firms, developers and early adopters of innovation, with a presence in international markets and providing a good practice to others.
- Renewable feedstocks

WEAKNESSES

- Regulations and policies hindering biomass, residues or by-products valorisation
- Production growing limited by local resources of feedstock
- Low level of wood processing and consequently low added value (in 2018, 52% of unprocessed roundwood was exported abroad; softwood roundwood is mostly processed in sawmills (68%) and hardwood roundwood is mostly used for energy purposes (67%)).
- Well organized monitoring of waste streams, but very limited or no systemic monitoring of by-products and side-streams of biomass in manufacturing sectors, consequently reduced potential for the cascading use of biomass side-streams
- Limited potential for developing scalable bio-based value chains due to small-scale and fragmented plants for biomass processing.
- Low level of business integration in 'conventional' bioeconomy-related industries, making it harder to develop industrial-scale biorefineries, or leverage for the development of bioeconomy clusters
- Successful businesses in various bioeconomy sectors but operating as individual firms on (usually niche) markets, lacking the capability, or willingness, to integrate into local/regional value chains
- Weak financial leverage of companies in both conventional and new bioeconomy sectors to make (investment-intensive and commercially risky) shifts to bio-based materials and technologies
- Limited leverage of industrial and portfolio investors (e.g. venture capital), weak interest of financial service providers for higher-risk investments
- Focus on public research institutions dedicated to basic research, rather than on new product and prototype development and demonstration
- Insufficient feedback from the economy on RDI needs and applicability of results
- Weak R&D infrastructure at the transition from laboratory to demonstration level (TRL 3-6) slows down innovation
- Low activity in RDI in major bioeconomy industries (except manufacture of pharmaceuticals and chemicals) on one side and weak involvement of research institutions at high TRLs inhibits upscaling of pilot projects
- No dedicated bioeconomy development strategy at the national level, leading to no systematic public support environment for the development of the bioeconomy
- Low level of policy coordination, leading to scattered and often non-coordinated instruments and measures targeting sectors/aspects of bioeconomy
- Lacking perception of bioeconomy as a strategic sector in public RDI funding and consequently inappropriate policies and lack of long-term funding
- Fragmentation of resources in the R&D sector due to national funding being directed to small projects and groups; weak cooperation and integration of R&D
- Administrative procedures and regulations inhibit development and commercialization through lengthy and uncertain implementation procedures
- Difficulties faced by innovating companies to attract investments of sufficient critical mass as they are of moderate size and weakly integrated into regional clusters

OPPORTUNITIES

- Sustainable woodland planning
- Discovering products with higher added value
- Energetic usage of the residual biomass
- Increased provision of forest-wood biomass – partly due to improved utilization of the reserves in the annual wood increment
- Development of a robust enabling environment, providing investment, ensuring scale-up, reducing risk and enabling a faster transition to market
- Adopting national strategic commitments to improve knowledge-intensity in bioeconomy sectors (e.g. development departments, clusters, networks)
- Macro-regional cooperation and business integration to make better use of the bioeconomy potential (e.g. BIOEAST)
- Closing local/regional loops of biomass use by setting up a network of small-scale modular biorefineries for the processing of different biomass sources (local2local principle)
- Technological and management know-how resulting from the strong presence of the wood and paper industries in the structure of manufacturing activities over the past decades
- Better use of opportunities provided by the European Research Area to enhance bioeconomy related research excellence, international collaboration, openness, and inclusiveness
- Internationalization and participation of stakeholders in RDI strategic partnerships can ensure knowledge transfer to the national level and direct the supporting environment
- Wider economic and social context (need for reduction of fossil resources and more efficient use of biomass by-products / waste streams)
- Growing awareness on the need for legislative changes towards environmental sustainability
- The integration of bioeconomy content covered by the country's strategic development documents (four of the nine priority areas of the Smart Specialisation Strategies include bioeconomy content, the Slovenian Industry Strategy 2030 highlights the importance of a low-carbon circular economy and sustainable management of natural resources)
- Post-pandemic recovery developing the circular bioeconomy through appropriate investment, planning and inter-sectoral coordination
- Increasing long-term demand for bio-based technologies and products, partly due to positive consumer perception for sustainable technologies, and partly due to the improving price-cost relationship of bio-based products
- Growing demand for bio-based products in some important export sectors of the Slovenian economy (e.g. wood, paper, chemicals, food additives and functional foods, automotive and electrical components)

THREATS

- Fluctuating feedstock prices
- Heavy bureaucracy

- Plant disease
- Potential unavailability of biomass (forest and agricultural) due to the impact of climate change
- Potential conflicts between alternative uses of biomass and the risk of over-exploitation of renewable carbon sources
- Capital-intensive and technologically advanced competition for the purchase of (mainly woody) biomass in neighboring regions
- The high capital cost of setting up efficient industrial operations for cascading use of biomass
- Large investments in biorefinery capacity (demonstration development and industrial) in the wider EU region and limited access to new value chains
- Inadequately sited biomass processing plants can disturb the price equilibrium, especially in the case of inappropriate subsidy policies (eg. negative experience with the biogas installations)
- Lack of appropriate definition of priority areas and objectives of bioeconomy development may result in continued sporadic RDI work on individual projects
- Loss of development and investment momentum at the transition to higher TRLs due to financial, technical and organisational challenges for commercialisation
- Many biomass processing technologies are protected by long-standing patents.
- Neglect of the bioeconomy in planning for post-pandemic recovery, reorientation of focus in public policies (eg. national security policy)
- Sporadic rather than systemic progress due to an uncoordinated legislative framework
- Negative public opinion, linked in particular to the energy use of biomass and some poorly designed support policies in the past (e.g. support for the construction of oversized and technologically inadequate biogas plants)
- Unfavorable price-cost ratios of bio-based materials and technological solutions
- Reduced public confidence in bioeconomy-related innovations ('greenwashing' or promoting projects with a doubtful (environmental, material, economic) result)

Table 5. SWOT WHOLE COUNTRY, SLOVENIA

Based on the data provided, it is essential to establish a Bioeconomy strategy at national level which coordinates the efforts, objectives and measures that different governance structures are implementing. Furthermore, to advance in the innovation process, there must be an increase in funding, jointly with a better communication and relation between researchers and industries, aiming to improve the TRLs of different valorisation technologies leading to a scaling of available technologies and applying the innovations at industrial scale.

The region is committed to the development of bioeconomy value chains, and SME´s are involved in several related initiatives. Additionally, there are some favourable conditions such as the availability of a high amount of biomass, the current low share of valorisation initiatives implemented (comparing to the potential), the presence of a strong manufacturing industry and the participation willingness of government and stakeholders of the region to promote bio-based initiatives. However, biomass logistic will be key for a successful implementation and the development of specialised logistic operators can play a significant role. Lastly, aspects that cannot

be predicted easily like to prize fluctuation due to climate extreme phenomena or plant disease, could prevent investments due to the high risk which should be addressed by the policy makers to design specific measures as well as educational and training programs to increase the attractiveness of skilled workforce.

3.6.Germany, Baden-Württemberg region SWOT

STRENGTHS

- Diverse biomasses available (different altitudes offer diverse biomasses) and versatile biomass supply
- Market leader in timber constructions; availability of innovative insulation materials; strength in carpentry/joinery; "Technikum Laubholz" (https://technikumlaubholz.de/en/)
- University of Hohenheim strong knowhow and research in agriculture
- Central location in Europe which implies an advantage in terms of supra-regional material flows and international trade
- Government commitment to push bioeconomy, allocating financial support measure to promote bioeconomy, developed support structure for start-ups/company foundations on state level, federal state level and trough funding organizations; political momentum in Baden-Wuerttemberg through coalition of conservative and green party gives bioeconomy the role of "peace bridge"/compromise; municipalities as initiators and developers
- Innovative technologies and entrepreneurship; already existing companies in the bioeconomy field, e.g. Tecnaro (https://www.tecnaro.de/en/); Innovative SMEs
- Regional processing and marketing structures
- Strong awareness of bioeconomy in the region

WEAKNESSES

- Short vegetation periods and high land pressure have led to lack of biomass
- High demand for chemical raw materials leads to competition for resources; existing industries are already dependent on imports of (fossil and bio-based) resources
- Existing and well-functioning fossil material flows hinder bioeconomy development
- Lack of digitization in the primary sector
- Lack of logistic concepts adapted to bio-based value chains
- Reduced number of large companies that actively practice bioeconomy (big players of the bioeconomy in Baden-Wuerttemberg are missing)
- Lack of regional processing and marketing structures
- For many companies, the term bioeconomy is not yet very well-known so there is a lack of a common understanding what bioeconomy is (decarbonization dominates public perception)
- Bioeconomy is not thought of in all policies
- Lack of CO2 pricing;
- Low demand for bioeconomy products
- Bio-based inventions (e.g. from Technikum Laubholz) are relatively far from market-ready
- Population aging
- Rural-to-urban migration
- Bioeconomy is not part of teaching/educational programs in most subjects

- Lack of cooperation between stakeholders

OPPORTUNITIES

- Using current crisis awareness as momentum
- Visibility trough stakeholder involvement
- Existing awareness for environmental issues and sustainabiltiy in society of Baden-Wuerttemberg
- Extensive research in a variety of disciplines; interdisciplinary research
- Monetary resources available
- Increase of the international market fluctuations
- Neighbouring federal states (e.g. Bavaria) and countries have a similar strong structure for R/D companies
- Creating regional identities/ community-building
- Bio-based innovations could trigger economic growth
- Increase self-sufficiency
- Expanding pioneering role in technology development
- Baden-Wuerttemberg can be a pioneer for other regions and reach societal backing; there is a comparatively widespread awareness of sustainability issues and resource efficiency aspect among population

THREATS

- Automobile manufacturers continue to rely predominantly on internal combustion engines
- Raw material export and import instead of regional use due to low logistics costs and no CO2 pricing
- Multiple crises that need to be responded to quickly
- Bioeconomy is often still seen as an elite Project and there is still little involvement of society and civil society group
- Lack of community-building/ development of a regional identity
- Shortage of resources; competition for land (food vs. fuel)
- Improve burocratic procedures (regulatory, funding, permissions, etc.)
- Education system needs to offer people more interdisciplinary education, e.g. bioeconomy as compulsory module in natural and agricultural sciences; subject change in universities is rather slow
- Rather slow culture change towards bioeconomy, to accelerate change successful practices examples are needed
- Global competitiveness and national competitiveness
- Transfer of research results into entrepreneurial action is slow or missing
- Need of incentives to bring bio-based innovations to market, e.g. through adequate CO2 pricing

Table 6. SWOT BADEN-WÜRTTEMBERG REGION, GERMANY

The region of Baden-Württemberg has a high variability of biomass resources. Nevertheless, the availability is currently reduced therefore effort should be allocated to improve the management

and increase side-streams and by-product valorisation. Additionally, finding a balance between the obtention of energy based on biomass resources and food production could also contribute to further promote other bio-based bio-applications in the region.

Moreover, even if the population of the region has a strong awareness on bioeconomy, there have been difficulties due to the uncertainty that enterprises face regarding the way bioeconomy promotion strategies are and will be implemented (lack of policies reinforcing concrete measures, innovation is not put into practice, abstract concept of bioeconomy). On the other hand, the region accounts with funding programs and research institutions with a large experience and knowhow. However, there is a lack of guidance on how to make it useful and how to make more tangible strategies. Consequently, it could be interesting to consider the design and establishment of educational programs to transfer to the general population and key stakeholders the importance of bioeconomy to meet the ambitious objectives established at regional, national and European level and how this strategy could contribute to promote economy growth as well as sustainable development at regional level.

Government and local authorities would most likely play key role to trigger the change and create a collaborative atmosphere for the different actors involved in the bio-based value chains, as well as to define the bioeconomic concept or improving the the regulatory and the bureaucratic process.

Lastly, collaboration between companies and local authorities would be fundamental in order to align efforts and design together the guidelines and the most suitable bioeconomy strategies.

3.7.Spain, Aragon region SWOT

STRENGTHS

- Wide forest areas
- Wide agriculture areas
- Sustainable woodland planning
- Good infrastructures network
- Existing successful cases in the region or neighbouring regions (bio-based value chains)
- Availability of public funding for research and development
- Access to finance for spin-offs and start-ups
- Large share of population located in rural areas
- Social integration programmes in place
- Active associations representing targeted social marginalised groups
- Large share of population located in rural areas
- Existence of successful programme which provides a subsidy for new creation of service cooperatives in rural cooperatives focusing on women
- Telework has contributed to make more suitable living in rural areas

WEAKNESSES

- Reduced number of agroindustries that are looking for alternatives to valorise their by-products
- Scarce marketing relevance of bio-based products
- Lack of workforce with the skills and knowhow needed
- Lack of infrastructures (biorefineries)
- Unstable supply for some feedstock (climate)
- Perception of high risk related to bio-based value chains
- Cost of feedstocks too high in some cases (straw for instance)
- Fluctuating feedstock prices
- Lack of market support measures
- Heavy bureaucracy
- Long time needed for return on investment for bio-based initiatives
- Lack of public support for scale-up
- Lack of financial support for new production facilities
- Access to finance for SMEs
- Lack of product standards and/or specifications
- Lack of workforce with the skills and knowhow needed
- Lack of concrete actions in the strategy designed to promote and support bioeconomy initiatives and bio-based value chains
- Lack of cooperation private-public to prevent forest fires

- Research and innovation should concentrate on finding solutions and valorisation schemes focusing on the regional biomass resources and by-products
- Biomass is sometimes produced during a specific period/season of the year while the supply to a consuming plant needs to be handle all year round
- Lack of basic services in rural areas (nursery, health centre, etc.)
- Employment associated to primary sector (agriculture and agroindustry) is many times seasonal and therefore less attractive
- New party elected can implied that programmes, etc. are no longer supported. Risk for long payback project and high investment

OPPORTUNITIES

- Under-used biomass potential
- Existing successful cases in the region or neighbouring regions (bio-based value chains)
- International recognised certification schemes (SURE for example)
- Companies with decarbonisation strategies looking to replace fossil-based raw materials/products/etc.

THREATS

- Prevalence of energy use
- International markets competition
- Lack of commonly agreed and global assessment tools
- Erratic demand of bio-based products
- Lack of specific regulations (related to bio-based products sustainability for instance)
- Lack of lifecycle concept as part of the product development
- Lack of fair sustainability comparison criteria (among bio-based and non-bio-based products)
- Lack of commonly agreed and global assessment tools
- Lack of transparent standards
- Climate change impact on the biomass yields achieved yearly
- Requirements associated with CAP endanger the implementation of new initiatives related to bioeconomy
- High-cost energy, fertilizers, etc. inputs for the primary sector

Table 7. SWOT ARAGON REGION, SPAIN

The traditional presence of agriculture and forestry sector in the region contributes to strength the bioeconomy potential of the region. However, the presence of bio-based industries is low, so a high amount of biomass residues and by-product is currently not valorised. In addition, the lack of workforce, especially workforce with the needed skills to work on the different steps of the bio-based value chains, make more complicated the development of new bio-based initiatives in rural areas.

Consequently, local authorities could play a key role to overcome these barriers. Educational programs to raise awareness and seeking to make bio-based sector more attractive, as well as trainings focusing on bio-based applications deployment and valorisation pathways (technologies) activities could significantly contribute to overcome the lack of skilled workforce and at the same time provide a different business line for primary producers while decreasing the current migration trend from rural areas to large cities.

In addition, setting up essential services in rural areas like doctors, schools, or supermarkets, would help to fix population in these zones.

Otherwise, measures should be implemented to improve the cooperation between the enterprises. Additionally, the existence of success cases that could be replicated and inspiring for other regions and companies could contribute to further promote the development of bioeconomy initiatives.

Finally, the harmonization of regulation and transparent standards, and the improvement of the bureaucracy process, could significantly contribute to trigger the adoption of bio-based valorisation schemes by different companies.

3.8.Netherlands, Apeldoorn region SWOT

STRENGTHS

- Large forest areas in the west
- Large agricultural areas in the east
- Modern progressive city in the middle
- Established bio-waste collection system
- Paper industry based on wood and recycled pulp
- Large food and feed producing industry
- Active initiatives on:
  Zero waste
  Organic gardering/ kitchen gardens
  Makersspace/experience lab CODA
  New techpark
  Share/ repair cafe

WEAKNESSES

- Apeldoorn municipality is currently focusing on energy transition not circularity/bio-based industry promotion
- Agricultural sector focusses on feed and food not production of bio-based materials
- Food/bio-based sector represents only a small part of Apeldoorn's workforce
- Industrial bio-waste (e.g. hotels/food industry) is outside of direct influence of municipality
- Forests are mainly owned by national agencies, not the municipality
- Small scale bio-based activities are mainly energized by volunteers and retirees (not part of workforce)

OPPORTUNITIES

- The nitrogen production of the feed/food agricultural industry is so large that farmes will need to shift to
- growing bio-based alternatives.
- Interest of citizens in bio-based/circular initiatives is growing
- The nation is promoting bio-based building/construction in connection with bio-based agriculture
- New initiatives to combine e.g. kitchen gardens with helping weaker social groups are starting
- Using bio-based residues as fuel is a very unpopular option

THREATS

- Closing farms in order to reduce nitrogen emissions is a debated solution

- Paper industry is controlled by global companies, closing factories in Apeldoorn region because of overproduction in Europe is currently discussed
- Paper industry becomes less competitive because of energy pricing in the Netherlands
- The political discussion on nitrogen emissions by farmers may stall bio-based developments in the next decade
- Small initiatives energized by volunteers and retirees may not be resilient

Table 8. SWOT APELDOORN REGION, NETHERLANDS

The region main economic activity is focused on the traditional sectors such as agriculture, livestock and paper industry. In this sense, Apeldoorn accounts with a large potential of bio-based natural resources which exploitation produces in turn a significant amount of by-product and side streams that could be valorised for different applications. Nevertheless, currently the new bio-based initiatives are only targeting energy production. Additionally, due to the nitrogen problem faced and that might require reducing the number of farms, the region is facing a transition period in which the current cattle farms will need to adapt their current business model and find additional sources of income. The paper industry could also need to face some changes. Therefore, the promotion of new bio-based activities could represent an opportunity to contribute to diversify the region economic activity and seeking to exploit the available natural resources and by-products and side streams obtained in the agroindustries.

On the other hand, there seem to be lack of coordination among regional and national priorities and strategies to reach the objectives established, so a strategy to align the regional and national strategies can contribute to build strong cooperation channels between the national agencies who own the forestlands and the potential exploiters of forest biomass in the region therefore enabling the development of additional valorisation pathways in the region.

Lastly, it worth to highlight that awareness regarding the bioeconomy strategy is significant in the region (population and municipality) which is an important starting point to promote biobased initiatives. Furthermore, some bioeconomy initiatives are currently ongoing such as Zero waste, organic gardening or the development of techpark which could contribute to trigger the change serving as examples of successful cases and inspirational.

3.9.Greece, Western Macedonia region SWOT

STRENGTHS

- Forestland potential is technically not fully exploitable
- Sustainable woodland planning (forests are by law sustainably managed, since most of them are public, selective cutting is allowed, clearcuttings are forbidden)
- Large share of population located in rural areas (above EU average)
- Social integration programmes in place
- Active associations representing targeted social marginalised groups

WEAKNESSES

- There is a reduced number of agroindustries that are looking for alternatives to valorise their by-products
- Agriculture areas are rather limited compared to other regions
- Collection system of feeedstocks only on pilot scale applied
- Lack of infrastructures (transformation/valorisation technologies)
- Prevalence of energy use
- Unbalance between offer and demand of bio-based products (more demand than offer)
- Non-existing success cases of bio-based value chains implemented in the region or neighbouring regions. Only on pilot scale
- Biomass suppliers many times do not provide information regarding the sustainability of the feedstock
- Lack of product standards and/or specifications
- Certifications deployment
- Lack of specific regulations (related to bio-based products sustainability for instance)
- Lack of workforce with the skills and knowhow needed
- Low degree of industrialization and diversification of local industry (prevalence of traditional production sector)

OPPORTUNITIES

- Availability of public funding for research and development
- Public support for scale-up
- Financial support for new production facilities
- Access to finance for spin-offs and start-ups
- Access to finance for SMEs
- Lifecycle concept as part of the product development with the assistance of local university and CERTH

THREATS

▪ Cost of feedstocks too high ▪ Fluctuating feedstock prices ▪ Lack of market support measures ▪ Regulations and policies hindering biomass, residues or by-products valorisation ▪ Lack of harmonized regulatory framework (lack of coherence among different policies related to bieconomy promotion) ▪ Lack of investor confidence (case by case approach, high confidence for simple applications, low for more complex)

Table 9. SWOT WESTERN MACEDONIA, GREECE

In Western Macedonia, a high rate of the land is devoted to agriculture and forestry, which is key to ensure a biomass supply to bio-based value chains. However, in some cases there is a lack of infrastructures and regulations (information, technology, transport) which makes difficult to coordinate and achieve the optimal management of biomass. In addition, the regional administration should improve the supporting measures and harmonized regulatory framework seeking to enable a more efficient use of available funding resources.

On the other hand, the lack of bio-based industries makes difficult to promote different valorisation schemes. Therefore, supporting actions in this sense could play a decisive role to increase the valorisation rate.

Finally, in contrast to other European regions, this one is highly populated in rural areas, but there is a lack of employers with the expertise needed related to the bio-based sector. In consequence, it could be beneficial to consider the planning of educational programs and trainings.

3.10. Croatia, Adriatic region SWOT

STRENGTHS

- Young entrepreneurs
- Existent LAGs (Local Action Groups)
- Community organizations
- Implementation of the BIOLOC project
- Regional biodiversity
- Existing demand for innovation
- Growing environmental awareness
- Enhanced utilization of waste materials
- Abundance of diverse products from forestry, agriculture and fishing sector
- Significant volumes of waste generated by tourism, offering substantial potential for repurposing
- Proximity to the sea
- Abundant biomass potential across various sectors
- Rising trend in separate collection of biomass
- Existing successful business examples

WEAKNESSES

- Limited availability of bank financing
- Biomass availability constrained by seasonal variations
- Limited awareness about the potential of the bioeconomy
- Underdeveloped biomass market
- Lack of interest among the local population
- Scepticism and the need for more advanced technology due to perceived unprofitability
- Inadequate and suboptimal waste collection practices
- Diminished local identity and perspective
- Insufficient personnel and capacity for project implementation
- Lack of educational initiatives
- Challenges in gathering stakeholders for training purposes

OPPORTUNITIES

- Collaboration between LEADER-CLLD and F/LAGs
- Promising opportunities in aquaculture, fisheries, and marine resource utilization
- Emerging consumer trends
- EU funding opportunities
- Abundance of resources considered as "waste"
- Rich diversity of natural resources in the region (knowledge and expertise)

- Entrepreneurs seeking transformation and innovation
- Establishing a sustainable system with clearly defined roles for all stakeholders
- Availability of information and knowledge sharing
- Influx of foreign capital
- LAGs actively involved in developing local development strategies and distributing them to local stakeholders
- Revitalization of small-scale farms
- Establishing connections with local institutions and organizations for comprehensive analysis
- Introduction of new subsidy programs
- Active involvement of associations representing marginalized social groups
- Implementing social interaction programs

THREATS
▪ Lack of supportive state policies ▪ Incomplete legislation framework ▪ Dominance of large corporations hindering market access for small farmers in the bioeconomy sector ▪ Rapid growth of mass tourism ▪ Potential exclusion of marginalized groups from business opportunities ▪ Adverse effects of climate change on biomass yields ▪ Fluctuating demand for bio-based products ▪ Higher profitability of imports compared to domestic production ▪ Demographic aging in rural areas due to youth emigration ▪ Risk of energy poverty in inland municipalities ▪ Challenges with pre-financing and lending ▪ High prices of equipment and technologies ▪ Unresolved property legal issues ▪ Insufficient availability of relevant data ▪ Slow administrative processes

Table 10. SWOT ADRIATIC REGION, CROATIA

Based on the information provided, the region accounts with a high amount and diverse biomass potential which is also available. Jointly with the emerging new bio-based value chains developed in the area such as aquaculture and fisheries, set a favorable framework to develop bio-based value chains that could contribute to improve the perspectives of the region and generate new opportunities for the marginalised groups of the region. Additionally, local groups are involved in diverse bioeconomy initiatives, and they act as connections between different stakeholders.

However, in the region there is certain skepticism regarding innovation, new technologies and the bioeconomy strategies. To address this issue, local authorities might need to increase effort to

further promote strategies and fundings schemes to promote local actions, increase educational programs for the general society seeking to raise awareness about bioeconomy.

Tourism activity is significantly increasing, and, in some cases, this could have negative effects like the generation of excessive rubbish. Nevertheless, it could be also seen and explore as an opportunity to promote bio-based activities to promote ecotourism alternatives in the area and improve the management of the residues generated for later valorisation.

Finally, the local authorities can play a key role to promote the coordination among the stakeholders the value chain, which would in turn contribute to reach a common understanding of the needs and barriers and potential measure to overcome them.

3.11. Bulgaria, Plovdiv region SWOT

STRENGTHS

- Existing rural business in bioeconomy sectors
- Large amount of unutilised residual biomass
- Available residual organic waste
- The food industry ranks first in the territory of the Plovdiv region
- Existing projects for capacity building, including education, training, awareness and knowledge transfer
- Access to finance for spin-offs and start-up and SMEs
- The industry for processing of essential oils is highly developed in the Plovdiv region
- Existing successful cases in the region or neighbouring regions (bio-based value chains)
- Large share of population located in rural areas relies on agri-food value chains for income generation

WEAKNESSES

- Bio-based industries are not so efficient
- Lack of infrastructures (transformation/ valorisation technologies) ensuring the value chain sustainable development
- Increasing depopulation of rural municipalities
- Lack of available skilled workforce: Low level of education and training, including Vocational Education and Training (VET) which leads to taking occupations requiring low education, skills and competences
- Low level of skills and competences of the socially disadvantaged groups
- Low integration in society of social marginalised groups (rejection of obeying the societal rules and law, moral obligations, etc.)
- Municipalities have various instruments to interfere, but they usually lack financial capital to back up the integration activities
- Low availability of public funding for research and development

OPPORTUNITIES

- Large number of agro-food industries are looking for alternatives to valorise their by-products
- Support through EU operational programmes and Smart Specialisation Strategies
- Transfer and implementation of circular technologies and business-models for by-products from agriculture and food industry
- Companies seeking for product diversification (agroindustries, chemical, biomaterials, etc.)
- Unpredictable supply of the raw material for production of renewable biofuels, pellets, bio-methane affects the sustainability of the investments
- Predomination of SMEs which are very flexible in adopting the bio-based technologies and recycling practise

- There are many research and educational entities addressing effective interaction with specialised problems that arise in the field of bioeconomy
- Bio-based solutions in Plovdiv region could have a high deployment potential but supporting measure would be required to accelerate-unlock this potential
- Existence of active associations representing targeted social marginalised groups
- New Operational Programme ongoing in the region "Research, innovation and digitalisation for smart transformation" 2012-2027

THREATS

- Climate change impact on the biomass yields achieved yearly
- High risk related to bio-based value chains as a result low level of investments
- Long time needed for return on investment (bio-based initiatives)
- Lack of public support for scale-up
- Lack of financial support for new production facilities
- Low level of cooperation on the science-business axis
- Slow adaptation and efficient adoption of specific EU regulations (related to bio-based products and sustainability for instance)
- Low awareness and competences on product standards and/or specifications
- Regulations and policies hindering biomass, residues or by-products valorisation and lack of harmonized regulatory framework

Table 11. SWOT PLOVDIV REGION, BULGARIA

In Plovdiv region, food industry is the main economic activity and there is a high availability of residual biomass or by-products that could be valorised for different applications. However, it would be necessary to implement new technologies to make the process more efficient, and new valorisation pathways must be developed to increase the profitability of the sector.

Although this region is densely populated, the migration rate is increasing which jointly with the lack of skilled workforce could hinder the successful deployment of biobased initiatives. Therefore, strategies to promote educational programs and training focusing on different aspects and skills required to promote bio-based value chains could contribute to increase the employability and fix population while ensuring a successful implementation of new initiatives.

Lastly, it would be essential to implement a bioeconomy strategy and a regulatory framework, jointly with the development of funding mechanisms and support measures to promote the implementation of new bio-based value chains, deployment of new technologies and encourage bioeconomy enterprises settlement.

3.12. Hungary, Észak-Magyarország region SWOT

STRENGTHS
▪ Good-quality forestland ▪ A relatively high reliance on wood of regional households due to an underdeveloped heating infrastructure and high poverty rates ▪ Industrialised region ▪ Knowledge based on biomass opportunities ▪ Devoted regional administrative staff and open-minded policymakers ▪ Inflation of energy prices, reducing prices of renewable opportunities
WEAKNESSES
▪ Low level of education ▪ High ratio of unemployment and lack of workforce in parallel ▪ Lack of knowledge on contemporary opportunities in bioeconomy in general ▪ Underregulated sector, lack of strategies and policy programmes ▪ Nature protection initiatives are sometimes by-passed by investors
OPPORTUNITIES
▪ Education programmes on bioeconomy opportunities, renewables and biomass industry ▪ Community formation and lobbying for a beneficial regulation and subsidizing ▪ Inclusion of local small-scale producers and farmers ▪ International collaboration and spreading of good practices ▪ Potential for setting into motion regional model programmes in bioeconomy ▪ Organizing think-tanks and regional collaborations between different actors
THREATS
▪ Conflicting national-level interests regarding local / regionalized energy production (rather centralized) ▪ Artificially reduced non-renewable energy prices ▪ Unsustainable exploitation of land and high-value forests ▪ A preference of short-term thinking instead of long-term investments on behalf of economic actors ▪ Impact on natural environment and the weather due to climate change

Table 12. SWOT ÉSZAK-MAGYARORSZÁG REGION, HUNGARY

North of Hungary counts with a high developed traditional bio-based sector, especially the forestry one. Therefore, there is a significant potential of biomass available, and knowledge related to this

sector. However, there is an untapped potential based on side streams and by-products valorisation that would be interesting to assess.

On the other hand, it would be useful to implement a regulatory framework, tunned according to the region's necessities. It is worth to highlight the current lobbying of local groups to achieve a beneficial regulation and subsidizing, which could contribute to push new and more effective policy programmes implementation.

Moreover, collaborative work between administration and bio-based stakeholders would help to overcome limitations for the biobased initiatives deployment due to uncertainties associated to the climate change impact on biomass supply and some conflicting interests in the energy sector.

Lastly, the high unemployment rate of the region is a key factor which must be considered when choosing and developing the new strategies. Also, an increase of knowledge and educational programmes devoted to bioeconomy could be essential to get skilled workforce.

4. Similarities and differences

Table 13 depicts the similarities and differences that have been identified based on the SWOT analysis implemented by the regions through the contact with representatives from the key sectors (social entities, industry, primary producers, administration bodies, research, etc.). Cells labelled in green are used for the regions that meet the statement while those regions in which the statement is not fulfilled or relevant are labelled in blue.

These differences and similarities can help to define actions that could be potentially suitable for different regions when developing guidelines or strategies and plan bioeconomy promotion actions.

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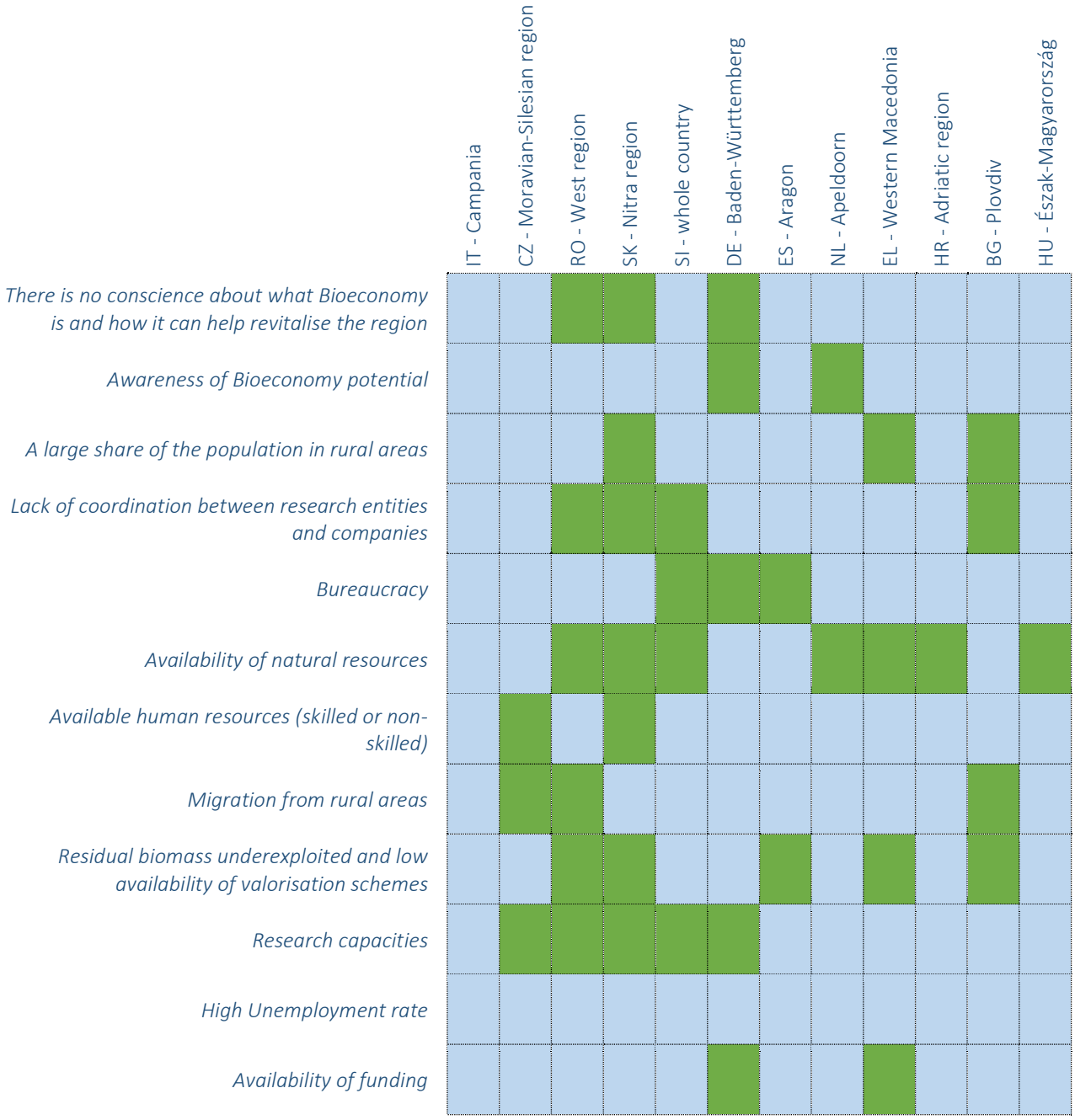

Table 13. SIMILARITIES BETWEEN REGIONS

On the other hand, there are also differences that must be considered since it might require especial attention when designing the recommendations. Firstly, natural resources are key, although not only raw material quantity but also availability should be analysed in detail including side-streams and by-products' availability from different production processes. In some regions such as the west of Rumania, Nitra (Slovenia), Adriatic region (Croatia) and Western Macedonia (Greece), there is a high availability of natural resources. However, in other regions like Baden-Württemberg (Germany) the potential amount is more reduced. In any case potential valorisation schemes should be defined carefully considering specificities of each region, market and social impact and environmental sustainability, among others, while always seeking not to displace food production.

Moreover, it is worth highlighting that most regions are aware of the effects that climate change can have on biomass supply which increases uncertainty that reflects on investment risk. Nitra and Slovakia regions could benefit from actions to raise awareness on bioeconomy and the relevance of water. In general basis, strategies should be established to adapt bio-based sectors to expected future conditions and to contribute to make these sectors more resilient.

Apart from natural resources, the workforce is also a key factor when promoting bio-based initiatives. In some regions, the large share of population improves the opportunities for employment in bio-based sectors, additionally in some of them young people represent a large share while in others like Baden-Württemberg (Germany) ageing population is the more relevant. Furthermore, rural migration is an issue in regions like Moravian Silesian (Czech Republic), West region (Rumania) and Plovdiv (Bulgaria), because they are looking for obtaining a university degree and job opportunities. Therefore, the promotion of different educational and training programs targeting bioeconomy and valorisation technologies for instance could contribute to fix population in rural areas.

Apart from these factors, others like raising awareness and market acceptance of population could improve the framework for bio-based initiatives deployment. For instance, the general public, local authorities and stakeholders from regions like Apeldoorn (Netherlands) and Baden-Württemberg (Germany) are very aware concerning the importance of bioeconomy strategies development, meanwhile Adriatic region for instance in Croatia might need to allocate some efforts in this regard. Consequently, in Apeldoorn (Netherlands) and Baden-Württemberg (Germany) it could be easier to implement the strategies with a bioeconomy focus and the general public is more likely to support it, so a successful implementation could be expected. On the other hand, in regions where bioeconomy concept is not highly developed, government's proposals in this regard could face opposition or lack of acceptance. Additionally, it could be useful to promote tangible projects as

success cases to prove to the population and potentially involved stakeholders the suitability of the solutions proposed and the potential benefits.

Lastly, funding schemes are different for the regions. For instances, in Adriatic region of Croatia and in Plovdiv region of Bulgaria, economic resources that could be allocated to finance bioeconomy projects are reduced while in Greece and Germany funding measure are available. In this regard, existence of supporting measures/funding instruments and an efficient management of such instruments can greatly contribute to maximize the deployment of bioeconomy in the regions.

5. Conclusions

As mentioned in the first chapter, the BIOLOC project aims to advance the role and impact of bio-based and social innovation to revitalise European local communities seeking to accelerate the all-inclusive transition to a resource-efficient and circular bio-based production and consumption system. For this aim, task 2.3 concentrates on the identification of Strengths, Weaknesses, Opportunities and Threats at regional level regarding bio-based systems. Overall, the work developed in WP2, aims to collect data that will be useful as input data for other actions envisaged in the project (mainly WP4).

Based on the information compiled and the assessment carried out at regional level, the following aspect can be highlighted. Firstly, the importance of the regulatory framework and the role of regional and national authorities to encourage the application of bioeconomy strategy. The development of bioeconomy strategies can contribute to decrease current uncertainty regarding the available funding schemes and regulatory schemes, improving therefore conditions for bio-based initiatives promotion. Moreover, innovation and research are key factors as well as the coordination among research organizations that produce results that could be scale-up at industrial level and stakeholders potentially involved in bio-based value chains. Local authorities could help to approach positions and create a collaborative framework.

On the other hand, it is essential to identify the stakeholders that are missing to cover all the steps of the bio-based value chain. It is worth to highlight that in some regions the presence of SME´s is considered a positive factor, and in others the opposite due to these companies usually have less investment capacity although in some cases they are also are more flexible to joint to new project. Therefore, it would be necessary to assess and develop in each case the type of measures that could more efficiently encourage industries to expand their business models, making bioeconomy strategy attractive and seen as an opportunity for them.

Moreover, natural resources are crucial for bio-based sectors deployment. Nevertheless, in some region these resources are limited and the promotion of bio-based value chain targeting different applications (biolubricants, biofertilizers, cosmetics, biomaterials, etc.) should be carefully planned to avoid food production replacement. Therefore, the biomass by-products and side streams currently underexploited could be an excellent option as raw materials to explore valorisation schemes since it would not only contribute to reduce the volume of residues (environmental impact redressed) but also provide an additional source of incomes. In any case, the deployment of new bio-based initiatives in all regions should be carried out in a sustainable and efficient way considering the environmental and social impact associated. Finally, according to the assessment carried out, there could be a good opportunity to integrate social marginalised groups incorporation when developing or improving bioeconomy strategies in the regions.

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BIOLOC

Annex 1. Templates sent to the regions to report strengths, weaknesses, opportunities and threats.

Excel version filled with some examples

STRENGTHS	WEAKNESSES
Wide forest areas Wide agriculture areas Sustainable woodland planning Existing succesful cases in the region or neighboring regions (biobased value chains)	Reduced number of agroindustries that are looking for alternatives to valorise their by-products Scarce marketing relevance of biobased products Lack of workforce with the skills and how-how needed Lack of infrastructures (transformation/valorisation technologies) unstable supply for some feedstock
OPPORTUNITIES	**THREATS**
Under-used biomass potential Existing succesful cases in the region or neighboring regions (biobased value chains) Large share of population located in rural areas	Prevalence of energetic usage International markets competition Lack of commonly agreed and global assessment tools Erratic demand of biobased products

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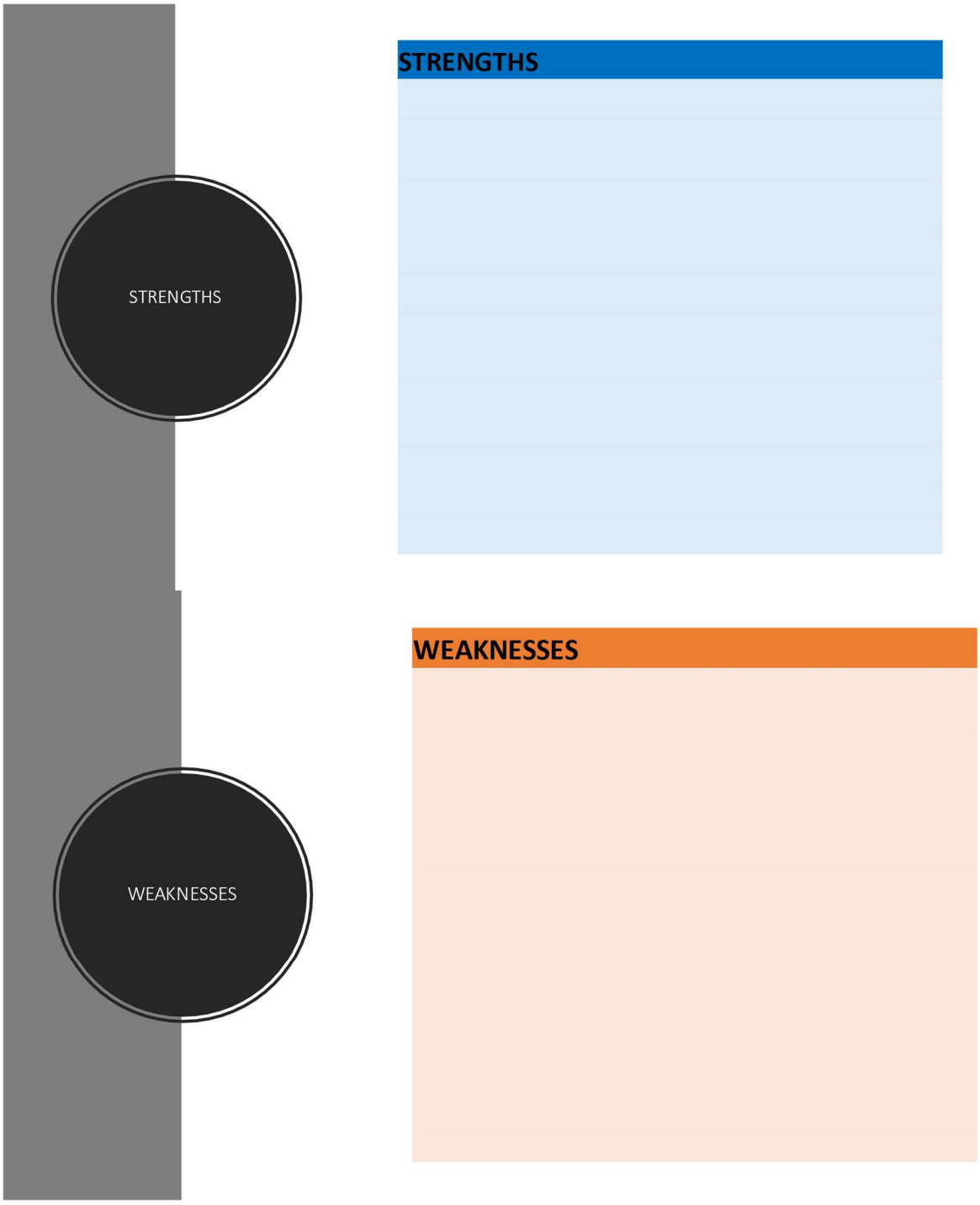
PowerPoint version



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OPPORTUNITIES

THREATS

Annex 2. List of potential opportunities, weaknesses, threats or strengths provided as examples to the regions to be completed and check during the interaction with stakeholders' groups representatives to perform the SWOT analysis

- Wide forest areas
- Wide agriculture areas
- Sustainable woodland planning
- Large number of agroindustries that are looking for alternatives to valorise their by-products.
- Companies seeking for product diversification (agroindustries, chemical, biomaterials, etc.)
- Efficient collection systems of feeedstocks
- Efficient transport and distribution of biomass
- Efficient recovery system/circularity schemes implementation
- Lack of infrastructures (transformation/valorisation technologies)
- Prevalence of energetic usage
- Stable supply of feedstock
- Erratic demand of biobased products
- Existing successful cases in the region or neighboring regions (biobased value chains)
- Perception of high risk related to biobased value chains.
- Cost of feedstocks too high
- Fluctuating feedstock prices
- Scarce marketing relevance of biobased products
- Lack of market support measures
- Underground markets
- International markets competition
- Regulations and policies hindering biomass, residues or by-products valorisation
- Lack of harmonized regulatory framework (lack of coherence among different policies related to bieoconomy promotion)
- Heavy bureaucracy
- Lack of incentives
- Long time needed for return on investment
- Lack of investor confidence
- Lack of public support for scale-up
- Lack of financial support for new production facilities

- Availability of public funding for research and development
- Access to finance for spin-offs and start-ups
- Access to finance for SMEs
- Taxation
- Suppliers provide information regarding the sustainability of the feedstock
- Lack of product standards and/or specifications
- Certifications deployment
- Lack of specific regulations (related to biobased products sustainability for instance)
- Lack of lifecycle concept as part of the product development
- Lack of fair sustainability comparison criteria
- Lack of commonly agreed and global assessment tools
- Lack of transparent standards
- Lack of international recognised certification schemes
- Large share of population located in rural areas
- Lack of workforce with the skills and how-how needed
- Social integration programmes in place
- Active associations representing targeted social marginalised groups
- Climate change impact on the biomass yields achieved yearly