POWER4BIO
REGIONS FOR BIOECONOMY

Summaries of 5 new regional bioeconomy strategies

Deliverable 5.3

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Table 2: Document History

ABBREVIATIONS

CEE: Central and East European

FSC: Forest Sector Council

RBH: Regional Bioeconomy Hub

WG: Working Group

WP: Work Package

NSGR: Nitra Self-Governing Region

PROJECT PARTNERS

CIRCE: Fundación CIRCE Centro de Investigación de Recursos y Consumos Energéticos

DBFZ: DBFZ DEUTSCHES BIOMASSEFORSCHUNGSZENTRUM GEMEINNUETZIGE GMBH

WR: STICHTING WAGENINGEN RESEARCH

META: META GROUP SRL

AKI: AGRARGAZDASAGI KUTATO INTEZET

NAK: MAGYAR AGRAR-, ELELMISZERGAZDASAGI ES VIDEKFEJLESZTESI KAMARA

EPC: EPC Project Corporation Climate. Sustainability. Communications. mbH

DRAXIS: DRAXIS ENVIRONMENTAL S.A.

BZN: Bay Zoltán Nonprofit Ltd. for Applied Research

UNFU: Ukrainian National Forestry University

CAPDER: Junta de Andalucía – Consejería de Agricultura, Pesca y Desarrollo Rural

MAE: Mazovia Energy Agency

USB: University of South Bohemia

CCB: Chemie Cluster Bayern GMBH

SPRING: Sustainable Processes and Resources for Innovation and National Growth

EWI: VLAAMS GEWEST (Government of Flanders)

SUA: Slovak University of Agriculture in Nitra

ECRN: European Chemical Regions Network (ECRN) e.V.

PUBLISHABLE SUMMARY

Understanding the crucial role that regions play in the transition towards a bio-based economy and in achieving the EU's bio-economic objectives, the POWER4BIO project has focused on supporting regional stakeholders to their bioeconomy development in a structural manner. Specifically, in the course of Task 5.3 -*"Developing regional bioeconomy strategies and roadmaps in CEE regions"*-, assistance is being provided to five partner regions in Central and Eastern Europe to develop new regional bioeconomy strategies: the regions of Lviv (Ukraine), Mazovia (Poland), Southern Great Plain (Hungary), South Bohemia (Czech Republic) and Nitra (Slovakia). This report presents the support provided to the regions - Guideline with suggested methodologies and examples and further recommended tools -, their bioeconomy strategy development process from January to October 2020 and their results: bioeconomy vision, strategic areas and strategies.

Some regions developed - or are in the process of developing - a stand-alone bioeconomy strategy with a bottom up initiative, where impulse is coming from industry and academia actors and match with regional administration support (mix approach), as in the case of Mazovia and Nitra regions. The region of Lviv presents the successful use of Smart Specialisation strategy to support regional bioeconomy advance. The region of Southern Great Plain has developed priority areas of a strategy and communicated to the regional administration as a recommendation, even though strategies in Hungary are only defined at national and counties level. Finally, South Bohemia has developed priorities on bioeconomy to existing strategic documents, such as the National Agriculture Strategy and Regional Innovation strategy, whilst is in progress to connect their bottom-up initiative with the regional administration for the development of a recognized and validated stand-alone bioeconomy strategy.

The different conditions, processes and solutions of the CEE regions towards developing bioeconomy strategies by following the support provided in the project might serve as good example to other regions as well outside of the project.

Further steps within Task 5.3 include the definition of an implementation plan (roadmap), to define strategic actions within each priority area, assign specific mechanism and appoint responsible for implementation, which will be reported in Deliverable 5.4 by the end of March 2021.

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1 INTRODUCTION

Since the introduction of the EU Bioeconomy Strategy, significant efforts have been invested in developing national and more recently regional/local bioeconomy concepts, striving to reach an economy detached from fossil fuels supply and which move towards a more sustainable development of society. This has resulted in rising initiatives, bottom-up ones from organized industry cooperation and/or stirred from research finding as well as those led by or emerged from policy decisions. Since various sectors, disciplines, policies and stakeholder groups converge in the bioeconomy, there is a need to develop innovative governance models that facilitate the coordination of actions towards a circular and sustainable bioeconomy. As well as tools that allow involved actors to make informed decisions – usually through transversal thematic and interest - and coordinate the necessary strategic actions. POWER4BIO project has focused on working with 10 EU partner regions on the establishment of regional bioeconomy strategies, as well as several accompanying resources and tools to facilitate their advance towards a strategic bioeconomy agenda and implementation plan. While developing and testing alongside a backbone methodology for regional bioeconomy strategy development, with the aim of supporting other EU regions beyond the end of the project.

The aim of this report is to describe the set-up of regional bioeconomy strategies in the five Central and East European (CEE) regions within POWER4BIO, namely Lviv (UA), Mazovia (PL), Nitra (SK), Southern Great Plain (HU) and South Bohemia (CZ).

This report describes 1) the support provided to the regions in form of a guideline (chapter 2) and 2) the process of the regions from their starting point and their results (chapter 3): presents the main development of regional bioeconomy strategies based on previously established Regional Bioeconomy Hubs (RBHs)[1], and regional bioeconomy visions. It presents step-by-step the analysis carried out, governance structures defined and development of priority areas based on a participatory approach. Besides, valuable information is provided on the region's experiences, such as their challenges and specific conditions, stakeholder engagement processes, their use and adaptation experience on the guideline.

The developed methodology of 8 steps for strategy development have been updated in the process of supporting Task 2.4, and finally a 4-steps method is suggested for strategy development and 5-steps method for roadmap development. These changes will be validated with the regions in the course of the final months of the project. The content and experiences of this Deliverable were important input to the Task 2.4 (structuring the tool), and gives important impulses to Task 6.2.2 (cross-border and trans-national networks), Task 6.4 (to training design), Task 6.3 (for the definition of actions to foster participation of regional stakeholders in international networks) and Task 7.5 (identifying the integration of activities of the Community of Interest (CoI)).

The developed methodology, examples and the regions experiences by applying it can be a useful support to further regions, aiming at developing bioeconomy strategies and strategic actions that contribute to a sustainable and circular bioeconomy. The activities here reported are part of Task 5.3 within WP5, which is still in development until March 2021.

[1] Regional Bioeconomy Hubs are platforms for cooperation, information and collaboration, and bridging sectoral and value chain stakeholders as well as the civil society – Quadruple Helix approach - in preparation for the regional bioeconomy strategy development.

2 SUPPORTING CEE REGIONS IN DEVELOPING REGIONAL BIOECONOMY STRATEGIES

Provided methodology – a guideline

As previously described, the methodology for regional bioeconomy strategy development has been provided to the regions in form of guideline, based on literature review and experiences collected with POWER4BIO five Western (WE) regions about their own experiences on regional bioeconomy strategies[2]. The 8 steps described in the guideline are as depicted in Figure 1. The steps are based on the previously established Regional Bioeconomy Hubs (RBHs) and defined regional *bioeconomy vision* during Task 5.1[3] (from October 2018 until September 2019). In order to use synergies within the project, all tasks and WP leaders were asked to provide recommendations on how to implement their own developed results.

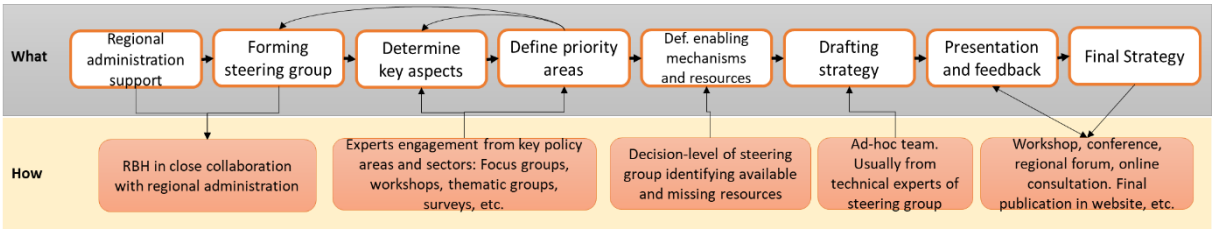

Figure 1: Recommended bioeconomy strategy development process. (DBFZ illustration)

Short description of main methodological steps for regional bioeconomy strategies development:

1. **Regional administration support**

   Reaching support from regional administrations and consensus between them regarding the decision to impulse a bioeconomy strategy for the region.

2. **Forming steering group**

   Form a group to coordinate the preparation of the strategy (steering group) in combination with an advisory group. This group would manage the process to define the priority areas, objectives and mechanism to apply for the regional bioeconomy, based on a participatory process that involves key stakeholders from diverse sectors of interest. As well as the feedback process, assuring the strategy approval.

3. **Determine key aspects**

   Carry out regional analysis and determine aspects that require strategic actions. The region should define - based on available information and previous analysis (Challenges and visions (T5.1), SAT and SWOT analysis

[2] See template 5.3 used to structurally collect Western and Mediterranean regions experiences in Annex I: Template 5.3 – Regional bioeconomy development in WE regions

[3] During Task T5.1 "Setting up Regional Bioeconomy Hubs in Central and Eastern European regions" the three first chapters of the guideline were focused on supporting the creation of RBHs and the co-creation of regional bioeconomy visions. The deliverable of Task 5.1 is a confidential report.

(T5.2), environmental analysis, and other available regional information) - the main aspects that require strategic actions for its improvement, development or to overcome current limitations.

4. **Define priority areas**

   Based on phase 3 and through a participatory process with RBH actors, advisory group and other key actors involved, the main areas of priority and corresponding objectives should be defined.

5. **Define enabling mechanism and resources**

   Include mechanisms and activities to enable strategic areas and objectives. To meet the targets set in the priority areas, the strategy should include the necessary resources and mechanisms that will facilitate its application. This includes indispensable policy coordination, identifying vital policy instruments. As well as, the identification of financial resources to sustain the implementation of each strategic area. Finally, it is essential to appoint responsible institutions for implementation and monitoring.

6. Drafting strategy

   Draft the strategy document with a group, which might be the steering group. The group should include an interinstitutional technical team and has to consider all results derived from the participatory process and previous regional analysis for the draft.

7. **Presentation and feedback**

   The drafted strategy document should be made available for consultation with regional institutions/administration involved in its development, as well as collect and take into account the feedback from the stakeholders involved.

8. **Final strategy**

   After including the received feedback from the consultation process, the strategy is ready to be presented, disseminated and enforced.

Although the 8-step methodology includes the preparatory actions to define an implementation plan (roadmap) aligned to the strategic objectives, a detailed description about its preparation, indicating specific activities and measurable indicators, is yet to be included, alongside the roadmap development in CEE regions to take place within October 2019 and March 2020.

This methodology allows any region, regardless of their bioeconomy development level, to decide on which starting step their own bioeconomy strategy process is being and apply and adapt to corresponding steps to their specific conditions, stakeholders involved and necessities.

The guideline with the 8 steps was delivered to the CEE regions in April 2020. Their experiences on applying it, their feedback and recommendations was followed up during several bilateral and group teleconferences.

The developed methodology and steps were applied in Task 2.4, and both Tasks are therefore in line. It is assumed that the regions have completed all steps of Phase 1 and 2 of the methodology from T2.4, equivalent to Task 5.1 and T5.2 of the Power4Bio project. Within the methodology of the T2.4, phase 3 and phase 4 describe exactly the steps carried out in T5.3, (depicted in D5.3 and upcoming D5.4). The final methodology and specific resources paired to each step will be included within the Bioeconomy

Strategy Analysis Toolkit (BSAT), as a user-friendly online tool with accompanying guidelines, best examples and expert's analysis to support regional actors leading bottom-up as well as top-down strategy initiatives in EU regions, beyond the finalization of POWER4BIO.

Workshop: Challenges and solutions of regional bioeconomy transition.

Besides the development of the guideline, a workshop was carried out within Task 5.3 and Task 5.4 to identify, complete and validate regional challenges and discuss solutions. The workshop was organized during the Bavarian Cross-visit, on the 20th of January 2020 in Munich, with the attendance of all regional representatives and other project partners. To allow interactive discussions, three small groups (tables) were created:

- Table 1: Stakeholders, cooperation, facilitating engagement
- Table 2: Policy framework and biomass supply
- Table 3: Business, market and funding instruments

The results can be seen in Annex II: Summary - Workshop on Regional bioeconomy challenges.

Supportive interactions with CEE regions

In order to monitor and support the regional activities when applying the guideline and to enforce stakeholder exchange and collaboration, specific bilateral and group follow-up teleconferences were carried out regularly. Besides, where possible an exchange or side event was organized during project meetings and cross-visits. During 2020, the activities carried out to set-up regional bioeconomy strategies in POWER4BIO coincided with the kick-off of activities to develop National Bioeconomy Strategies within the BioEast initiative[4]. Thus, the need was communicated by some regions from the very beginning to wait for a further development stadium in the National Bioeconomy Strategy before starting with the regional strategy. On one side, this relates to the procedural impossibility of generating a stand-alone regional strategy without an established national one. On the other side, it refers to the need of interpreting national bioeconomy goals within the regional strategy, as well as translating policy and financial mechanisms made available by the national initiative towards the regional level. In addition to previous considerations regarding their national strategies, in particular the region of Southern Great Plain (HU) communicated not having the possibility of setting-up the strategy at their regional level, given that in Hungary strategies can be generated at national and at county level only. In the same line, the region of South Bohemia indicated also that a stand-alone strategy would not be possible during the development of this Task. However, in South Bohemia the efforts have been directed to include bioeconomy within other regional strategies, such as the regional innovation strategy and other national strategic plans as the National Agriculture strategy. For the specific situation of these two regions, the advice was to follow up as much as possible the guideline steps in the generation of a recommendation document to the region, which provides the analysis and strategic priorities and actions to be taken in view of the current regional status. The regional representatives will then communicate these recommendations to their regional government and offer it as a regional analysis to support decision-making.

[4] bioeast.eu/

The most important meetings and interactions during this task are presented in Table 3.

Meetings and interactions with CEE regions during strategy development process		
Activity	**Date**	**Description**
Preparatory meeting	15.11.2019	To discuss current status, main needs and approach towards the beginning of the task.
Task approach	19.02.2020	Presentation of task approach and plan for the first six months during the General Assembly meeting held in Belgium.
Teleconference: Project available and planed resources.	02.04.2020	Teleconference with WP leaders, task leaders and regional representatives for an explanatory exercise to all regional partners regarding the content and possible use of at that time finished and under development deliverables. The meeting included D2.3, D3.3, D3.4, D4.1, D5.2 as already finished and D4.2, D4.3, D4.4, D5.3 as deliverables under development.
1st Bilateral calls with each CEE region	16-17.04.2020	First follow up call to identify current advance in regional strategy development. In this meeting regions responded to following questions: - How has been the development of activities for the strategy from the end of T5.2 until now? - Which is the status of the regional strategy development? - Which role is the RBH playing in that process? - How is the support of policy makers at regional or even national level so far? - Do you have any questions regarding the recommendations given in the guideline? - In which phase (according to the guideline) is the region now? - Do you require other resources you have not find in the guideline? Which ones - Additional comments
2nd Bilateral calls with each region	4-10.06.2020	Second follow up call to track current advance of regional strategy development and the revision and exploration by CEE regions of POWER4BIO tools and resources previously explained in April. This meeting was hold together with WP6 for an initial discussion regarding cross-regional cooperation.

Group teleconference	11.09.2020	All 5 CEE regions shared their advance since last meeting in their regional bioeconomy strategies. Each region responded to following questions: - What have been the activities for regional strategy development of the last months? And what is the status? - Which resources have been used? Internal or external to the project - Lessons learned of strategy development - What is the plan for the following months? – Until end of the year. - What are the current support needs? - Feedback to the guideline

Table 3: Meetings and interactions with CEE regions during strategy development process

3 REGIONAL BIOECONOMY STRATEGIES IN CEE REGIONS

3.1 Preparatory steps for the CEE regional bioeconomy strategies

Several results delivered by the project from different Tasks are relevant for the regions, to support building their bioeconomy strategy. Some of them are the key performance indicators[5], a selected inventory of tools to support assessment of bioeconomies[6], a set of best business cases in diverse areas of bioeconomy (biochemicals, bioenergy, food & feed, biomaterials and cross-cutting category of biorefineries)[7], a deep analysis of EU and national policies relevant to bioeconomy[8], best examples of good measures at regional level, repository of financial instruments[9], or the guideline to design the most suitable financial products[10]. The regions applied the Self-Assessment Test, carried out their SWOT analysis and the assessment of the bioeconomy status. Based on the developed guideline, the regions created a consolidated RBH, and their regional bioeconomy vision. All these efforts, steps and results are important preparatory steps for the bioeconomy strategies.

As presented in Figure 2, regional processes carried out by the regions - in grey boxes -, are presented at left hand side for 2019, at right hand side for 2020. The POWER4BIO resources used by the regions thought the 8 recommended steps and recommended in the guideline are also depicted in Figure 2 – green boxes -, and in line with the final methodology in Task 2.4. These resources assisted the decisions of regional actors, most related to steps were the regional bioeconomy challenges and/or the opportunities for its development were carried out. Further information on the individual regions steps and results can be found in the coming sections.

[5] Deliverable 2.2
[6] Deliverable 2.3
[7] Deliverable 4.1
[8] Deliverable 4.2
[9] Deliverable 4.3
[10] Deliverable 4.4

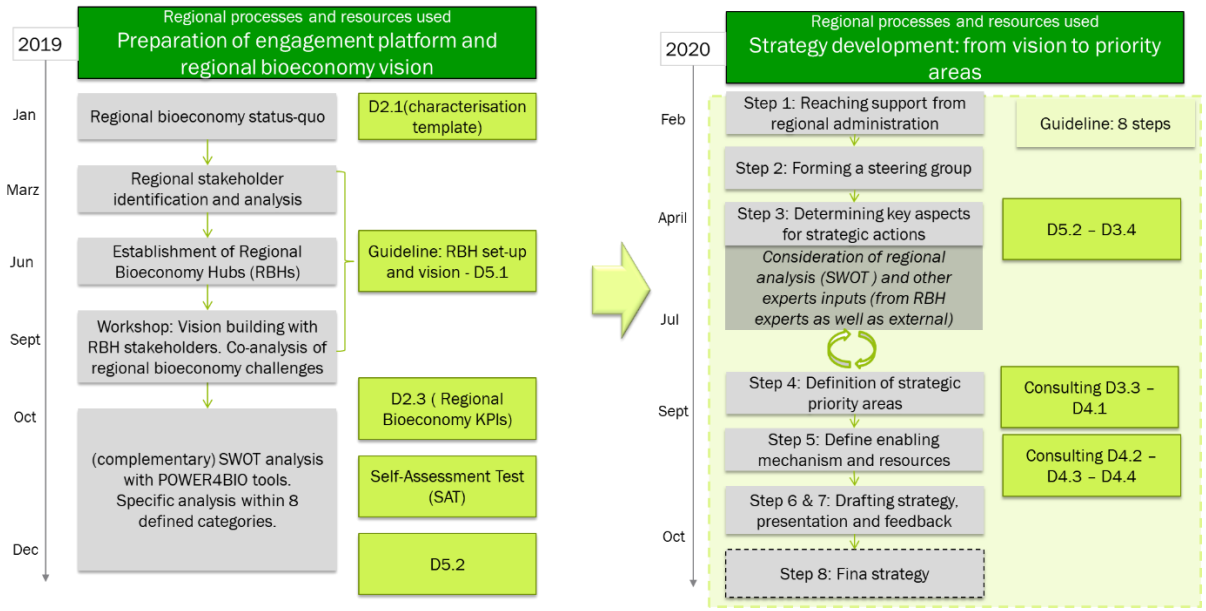

Figure 2: Regional processes and resources used – first two phases. (DBFZ illustration)

3.2 Summary of regional advance in strategy development - Application of the guideline, feedback and lessons learned

The methodology provided in the guideline represents a good practice and optimal development from vision to strategic priority areas, leaving the regions ready for the roadmap definition, final consultation and ratification of the final strategy afterwards. A rich participatory process is recommended during these 8 steps as well as consultation with experts and the analysis of most useful mechanisms at hand in the region to be specifically assign later on during roadmap process. Table 4 specifies the advance of each 5 CEE regions in comparison along the recommended 8 steps of the methodological guideline.

Methodology steps / CEE regions	Step 1. Reaching support from regional administrations	Step 2. Forming a steering group.	Step 3. Determining key aspects that require strategic actions.	Step 4. Definition of strategy priority areas.	Step 5.Define enabling mechanism and financial resources	Step 6. Drafting the strategy document (Writing draft from vision to priority areas).	Step 7. Presentation and feedback of strategy draft.	Step 8. 8.Final regional bioeconomy strategy (before implementation plan).	Next step: Started with roadmap definition
Lviv Region	⚑	⚑	⚑	⚑	⚑	⚑	⚑	⚑	⚑
Mazovia	⚑	⚑	⚑	⚑	⚑	⚑	⚑	⚑	⚑
Nitra	⚑	⚑	⚑	⚑	⚑	⚑	⚑	⚑	⚑
Southern Great Plain*	⚑	⚑	⚑	⚑	⚑	⚑	⚑	⚑	⚑
South Bohemia	⚑	⚑	⚑	⚑	⚑	⚑	⚑	⚑	⚑

⚑	Achieved
⚑	In progress
⚑	To be carried out

Table 4: Individual advance of regional strategy process in relation to the recommended methodology.

Currently, Mazovia and Lviv regions are the most advanced in their strategy development having already hold a consultation process of strategy draft and started the definition of their roadmap. On the case of Southern Great Plain as described before, all steps of the methodology have been followed and applied to a recommendation for regional strategic bioeconomy development, which has been shared

with regional and national institutions/administration and bioeconomy related political and technical experts. However, once more is here clarified that an approved strategy is not possible administratively for regions (NUTs 2) in Hungary. Actions in process and to be commenced – according to recommended steps - during the remaining development of Task 5.3 are mostly experienced by Nitra and South Bohemia regions. Although both regions have worked on additional actions to position bioeconomy at national and regional strategic initiatives, which although very relevant for their specific cases cannot be depicted in within the comparison being made to the methodology in Table 4.

Efforts are currently directed to the completion of the 8 steps methodology by all regions, as much as their current context allows. Several context specific factors delay the desired advance, for example: 1) the creation of the new Ministry of Investment and Regional Development of the Slovak Republic, and the so associated significant effort to align existing policies and regional strategies, 2) the effects of Covid-19 on coordinated work, as in the case of Nitra, 3) a challenge to motivate regional administration to take a leading role within the strategy development process in the region as in the case of South Bohemia. All final development of the strategy set-up for each region and their final roadmaps will be reported in Deliverable 5.4 by the end of March 2021.

Lessons learned from guideline application

CEE regional representatives in POWER4BIO have expressed the usefulness of the guideline, particularly due to the detailed explanations and specific indications of resources to use, actors to involve and aspects to consider for each step. Also, is step-by-step character has been useful for some of the regions as planning tool, and to communicate stakeholders engaged in the RBH which are following steps to be taken during the strategy development process. Some specific comments are:

- Southern Great Plain (HU): *„This guideline presents detailed procedures for regions with low bioeconomy maturity to create their own regional bioeconomy strategy. It is very useful and includes really in-depth procedure descriptions for all phases of strategy development and we used most of the recommendations even despite of our really unique situation."*
- Mazovia (PL): *"The established guidelines allowed to focus on the most important aspects when developing a bioeconomy strategy and gather a well-selected group of experts as an advisory group".*

For the use of the guideline by other EU and non-EU regions getting ready to develop their bioeconomy strategy, the main recommendations from CEE regions are:

- The guideline considers also preceding steps to strategy development dedicated to stakeholder's engagement and vision building, which enhance required exchange and its directed to facilitate required data collection during strategy development, as well as conciliation of differentiate goal between stakeholders' groups.
- Although the guideline describes an optimal situation, the experience of the regions have proved that with some minor adjustments it could fit the situation of all EU, as well as non-EU regions. These adjustments should respond to real regional conditions, an according to discussions with regional stakeholders, while maintaining the main rules of the proposed methodology.
- The importance of establishing trust relationships within regional stakeholders should not be underestimated as well as their required motivation to go along all recommended steps. Instead trust can be enhanced by long-term processes or cooperation.

- *"This guideline could be useful also for the regions with more developed bioeconomy in re-thinking or updating of their strategies"*
- *"The planning of bioeconomy development should be directed within individual public policies, taking into account demographic, economic trends, which will allow to reduce the scale of negative changes. It is worth following the guidelines step by step as in the manual, which streamlines and speeds up the entire process of strategy development. Find a group of experts from various fields so that the strategy can be a comprehensive document".*

3.3 Individual Reports on Regional Strategy Development

Lviv Region, Ukraine

Regional profile

The Lviv region belongs to the most wooded regions of Ukraine since forests occupy 31.8% of its territory, making the forest sector one of the main pillars for Lviv bioeconomy. Correspondingly, it holds an incumbent industrial potential in the forest sector with more than 100 companies dedicated to woodworking, and production of firewood, pellets and charcoal. In total the forest sector of the region contribution to the regional industrial complex makes up with a 33 % in number of enterprises, 17 % in number of employees and 14 % in turnover. Further key information of the regional profile of Lviv have been summarized in Table 5.

Profile of Lviv region, Ukraine		
Total regional population		2,512,084
Total area in km²		21,833
Gross Domestic Product million EUR[11]		111,653
Gross Regional Product million EUR [12]		4,948
Regional employment (2018)[13]	Nº people	%
in agriculture (average number of full-time employees)[14]	8,877	0.85
in agriculture (number of employed persons)	187,27	17.84
in forest sector	18,172	1.73
Regional use of land (2017)	ha	%
agriculture	1263,900	57.89
forest	694,600	31.8

[11] Eurostat 2019 https://ec.europa.eu/eurostat/documents/2995521/9618249/1-26022019-AP-EN.pdf/f765d183-c3d2-4e2f-9256-cc6665909c80
[12] Regional Office for Statistics http://database.ukrcensus.gov.ua/statbank_lviv/Database/02VALOV_MACRO/databasetree_en.asp
[13] Regional Office for Statistics http://database.ukrcensus.gov.ua/statbank_lviv/Database/02VALOV_MACRO/databasetree_en.asp
14 Differentiation between full-time employment as the official statistics of employees working at agricultural enterprises and employed persons as self-employed or independent working on their own land.

Main regional industries		
Regional biomass availability (2017)		
Timber in mln m^3		148,4
Forestry waste in thou. m^3		160,3
Wood residues at enterprise in thou. m^3		50,4
Post-consumer wood in thou. t		123,8
Straw in thou. t		362,8
Oil in thou. t		129,4
Bioeconomy baseline and energy potential	Nº plant	t/day
Biodiesel production	1	25

Table 5: Profile of Lviv region, Ukraine

In general, the development of the bioeconomy strategy in the Lviv region is the Smart Specialisation Strategy and goes hand-in-hand with the current development of the Lviv Regional Strategy for 2021-2027, which should be elaborated by December 2020. The Lviv Regional Strategy acts as an umbrella for various regional programmes. In this context, the draft document on regional bioeconomy strategy is planned to become an integral part of the Smart Specialisation Strategy and is expected to be fully elaborated by February 2021 the latest.

The understanding of Bioeconomy for the Lviv regions is “the production of renewable biological resources and the conversion of these resources and waste streams into value added products, such as food, feed, bio-based products as well as bio-energy”.

Step 1: Regional administration support

The support of regional administration for the development of the bioeconomy strategy was sought since the establishment of RBH during 2019, which has been based on the existing Forest Sector Council (FSC), founded by the Lviv City Council and the Ukrainian National Forestry University in 2016. The decision to build over the wide networks hold by the FSC, allowed for the integration of already engaged public sector (Lviv Regional State Administration, Lviv Regional Forestry Administration and Starosambirsky District Council), private sector and academia.

Step 2: Forming steering group

While several actions have been taken including all RBH engaged actors, such as the definition of the regional bioeconomy vision in June 2019, the development of the strategy draft, however, has been delegated to a smaller core group of experts within the FSC members (including academia, NGOs and

industrial associations), and governmental representatives from the Department of Economic Development of Lviv Regional Administration as shown on Figure 3.

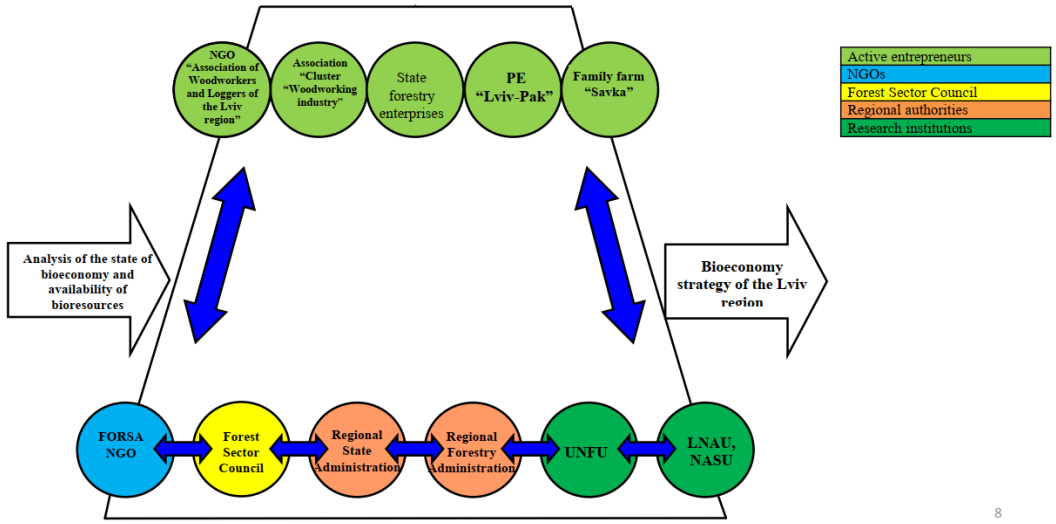

Figure 3: Governance and organisation for the development of Lviv´s regional bioeconomy strategy. (Lviv illustration)

Key actors have been the Lviv Agrarian University and National Forestry University as well as industry representatives of wood packaging, wood working companies, association of woodworkers and loggers as well as farmers representing small and medium agriculture business. Finally, the NGO Forza, has been included as a representative of civil society and environmental interests, mainly the sustainable use of resources and nature conservation.

Step 3: Determine key aspects

The process to determine the key aspects to be tackle by the strategy started with the visioning workshop in June 2019 (Task 5.1), were regional bioeconomy experts carried out a regional SWOT analysis. From there onwards the analysis has included several discussions and interactions regarded within the participatory approach, with key regional stakeholders and advisors, and integrating the analysis of provided resources from POWER4BIO. Key resources from other WPs used in this step include the catalogue of technologies solutions, were all solutions related to wood feedstock were selected and analysed, as well as the SWOT analyses delivered to the region in Task 5.2, discussed with FSC in one of one of several organized round table meetings. The challenging fields encountered in the SWOT analysis have been regarded as opportunities, which should be mentioned in the regional bioeconomy strategy.

Drivers, challenges and goals of new bioeconomy strategy

Preliminary to the strategy development process the region counted only with a mention of bioeconomy within the regional strategy - *Strategy of the Lviv region development for the period up to 2020*, however, not clear direction had been set for its development. This and the increasing relevance for a sustainable development at national and regional level, signalized by the *"National Action Plan in reference to Renewable Energy for the period up to 2020"* and National Energy Strategy up to 2035

"Safety, Energy Efficiency, Competitiveness", have driven the interest of the Lviv region to further develop their bioeconomy. Regional economic advancements as well as creation of workplaces are key motivating factors for the strategy development. For this reason, in parallel to the strategy implementation, the region plans to establish the bioeconomy support service, which would conduct analysis of the regional potential, advice regional government on good practices regarding financial support mechanism to the regional bioeconomy as well as serve as a reference point to the bioeconomy entrepreneurs.

The lack of awareness, scarce financing and uncertain economic situation, reinforced by the pandemic situation, are regarded as the main challenges to the regional bioeconomy. As the national GDP is expected to fall, this could hinder the allocation of funds for the regional bioeconomy strategy. The bioeconomy is not yet perceived as a reliable and profitable sector, and therefore, the country could prioritize the conventional industries to seek economic recovery. At the same time, the crisis can bring opportunities. Thus, the high unemployment rate could be an additional chance to engage new labor force into bioeconomy field, provide specialized training courses and redirect the economy towards new bio-based sectors.

In order to secure political support and avoid inconsistencies in strategic planning and funding programs in the region, a close integration of the bioeconomy with existing strategies and development programs is essential. An overview of important legal and strategic frameworks considered while in the development of the bioeconomy strategy is presented in Table 6: Most relevant policy framework considered during Lviv´s bioeconomy strategy development.

Most relevant policy framework considered during Lviv´s bioeconomy strategy development	
Policy, strategy, regulation	Main aspects considered for Regional Bioeconomy Strategy
Development strategy of the Lviv Region for the period 2021-2027	Transversal regional strategy, which comprehend the bioeconomy as one of the smart specializations of the Lviv Region. It is expected that 69 bioeconomic projects will be implemented within its frameworks with assign financial resources.
The Wood Building Programme for the period 2016-2021 (Finland)	The program is aimed at increasing the use of wood in urban development, public buildings as well as large constructions such as bridges and halls.

Table 6: Most relevant policy framework considered during Lviv´s bioeconomy strategy development

Furthermore, forest resources in the country are experiencing an increase in price, which questions the economic viability of national companies in this field. Therefore, in search for innovative solutions, the Wood Working Industry Cluster decided to reorganise itself, and in April 2020 created a new branch – Bioeconomy Cluster – with the focus on forest bioeconomy. It is expected that the Bioeconomy Cluster will complement the activities of the FSC: while the FSC serves as a regional RBH for all interested stakeholders, the Bioeconomy Cluster specifies on technical and business knowledge in the area on wood working industry. Additionally, as the forest sector represents the focus of the regional bioeconomy, but is regulated on a national level, the regional experts together with legislators are preparing the proposal to draft a law on Wood Market.

Step 4: Define priority areas

As a result of step 3, the definition of priority areas has taken place, based on the regional bioeconomy vision agreed in the visioning workshop[15] and formulated as following:

> ***'Strengthening of the competitiveness of the bioeconomy of the Lviv region'.***

In order to move towards this vision, the region has defined forest[16], agriculture[17] and food industry[18] to be the driving sectors of the Lviv bioeconomy and their development should follow three main principles:

- Awareness raising: bioeconomy is a locomotive for building the future of a prosperous sustainable society. Forest sector is the leader of the bioeconomy of the Lviv region.
- Transition from the linear model of the economy to circular (closed loops) bioeconomy (rational and sustainable use of the bioresources);
- Development of the human capital for the bioeconomy sector (competence, skills, jobs).

Concrete steps and directions have been disclosed in seven components defined to support the areas of priority and specific actions have been assigned to each of them as shown in Table 7[19].

Main components and specific actions for Lviv´s bioeconomy strategy	
Resource support for the bioeconomy	• Calculation of the amount of bio-raw material in the Lviv region (wood and agro raw materials). • Establishment of a regional biomass exchange to facilitate access to the resource and balance exports of bio-sector product.
Waste management	• Calculation of the amount of waste generated at bioeconomy enterprises of the Lviv region.
Competitiveness	• Supporting small business bio economics through targeted preferential lending and reimbursement of part of the loan interest.
Public Private Partnership	• Elaboration of the new state program "Regional wooden building" for the bioeconomy development • Improvement of the "Regional Target Program of Forestry Development of the Lviv Region" for the bioeconomy development • Development and improvement of the "Comprehensive program of support and development of agricultural production in the Lviv region " in view of the development of the bioeconomy

[15] Template 5.1 of Lviv region

[16] Forest sector in the Lviv Bioeconomy strategy includes: forestry and logging, wood processing, furniture production, carpentry production, floor covering and wall facing, roofing works, pulp and paper industry.

[17] Agriculture sector in the Lviv Bioeconomy strategy includes: plant growing, livestock farming and fish farming.

[18] Food sector in the Lviv bioeconomy strategy includes: food production, beverage production, and production of tobacco products.

[19] Table 7 provides only a section - not comprehensive - of identified actions in the strategy development process of Lviv.

	• Development and Improvement of the "Program for Increasing the Competitiveness of the Lviv Region" in view of the development of the bioeconomy • Strengthening the work of the Export Promotion Center in view of the development of bioeconomy industries • Development and Improvement of the "Program of Regional Competition for Local Development Projects in the Lviv Region " in view of the development of bioeconomy • Development and improvement of the Energy Saving Program for the population of the Lviv region in view of the development of the bioeconomy (among others)
Cooperation	• Involvement representatives of the Woodworking Industry Cluster Association and Bioeconomy cluster in solving urgent issues of bioeconomy of the Lviv Region • Involvement of representatives of the Association of Woodworkers and Forestry Providers of the Lviv Region to solve topical issues of bioeconomy • Involvement of all members of the Forest Sector Council in solving urgent issues of bioeconomy of the Lviv Region • Collaboration with the united territorial communities of the Lviv Region and involving them in solving various problems through bioeconomy approach • Collaboration with the united territorial communities of the Lviv Region and involving them in solving various problems through bioeconomy approach • Cooperation with the Center for Business Promotion and Attraction of EU4Business Programs for Creating Competitive Advantages of the Bioeconomy of the Lviv Region (among others)
Knowledge and education	• Establishment of a network of educational, scientific institutions and enterprises to provide qualified personnel with bioeconomy sector • Development of research initiatives for introduction of innovative technologies in the bioeconomy sector • Initiation of implementation and promotion of bio-environmental projects and expertise • Promotion of bioeconomy • Development of educational programs in the field of bio economics • Initiation and promotion of environmental projects and expertise (among others)
Dissemination	• Promotion of bioeconomy ideas at national level • Organizing conferences on bio economics • Participation in the work of profile exhibitions • Publications in the media • Forming a circle of bioeconomy experts to stimulate the creation and development of SMEs in this field

	• Dissemination of successful samples (successful business models of bioeconomy) following the examples of EU countries

Table 7: Main components and specific actions for Lviv´s bioeconomy strategy

Additionally, the region of Lviv have decided - within stakeholder´s discussion for the strategy development – to take into consideration the recent effects of Covid-19 to regional bioeconomy, thus including one extra component within the smart specialization strategy:

Extra Component: Impact of the Coronavirus outbreak on the Bioeconomy (Table 8).

Positive and negative impact of the Coronavirus outbreak on the Bioeconomy	
+	-
• Humanity will rethink priorities and reorient itself. • Closing borders will cause benefits for countries that have a lot of renewable resources. • Export-import operations will not be so widespread and as a result countries with circular economies will benefit. • High unemployment rate is an additional opportunity for bioeconomy to engage new labour forces. • Health care-oriented businesses will develop. In this regard “Green care” and pharmaceutical industry are components of the bioeconomy. • Raw materials (including renewables) will be cheaper that is a considerable advantage for bioeconomy. • The state will manage social and other necessary businesses, including the bioeconomy. •	• Quarantine measures will cause considerable economic crisis. • Global recovering will not be concerned with the problems of bioeconomy. • Unemployment will cause movement of the labour workforce towards “usual businesses". • The crisis will hit poor countries. Ukraine will fall more than others. • Bioeconomy is not a very profitable industry. It will be hard to develop it. • Substantial financial aid package will be possible only for rich countries. • The pandemic will pass and everyone will forget and nothing will change. •

Table 8: Positive and negative impact of the Coronavirus outbreak on the Bioeconomy

Neutralization scheme of the negative impact of the Coronavirus outbreak on the Bioeconomy Strategy implementation in the Lviv Region is shown in Figure 4.

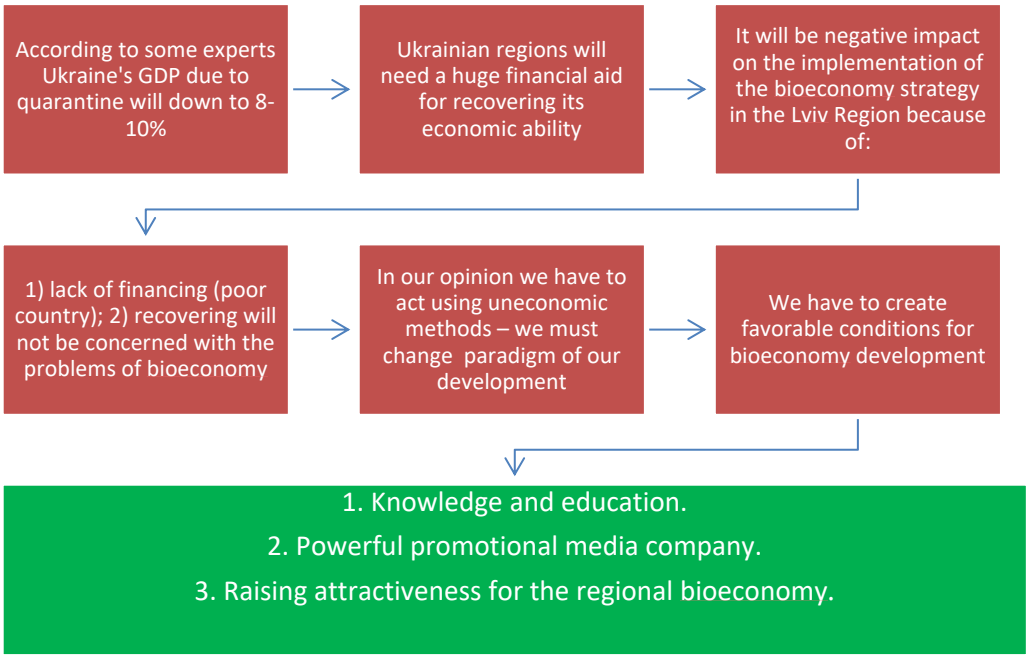

Figure 4: Neutralization scheme of the negative impact of the Coronavirus outbreak on the Bioecomy Strategy implementation in the Lviv Region. (Lviv Illustration).

Step 5: Define enabling mechanism and resources

The region has identified the enabling of the Lviv Bioeconomy Strategy and actions planed – being a Smart Specialisation Strategy – within the mechanisms defined in the new regional Strategy *"Development strategy of the Lviv Region for the period 2021-2027"* approved in February 2020. In particular, within two of the strategic goals of these document:

- Competitive economy based on smart specialization, which includes in its action plan a total of 56 project to be carried out. 36 of those projects corresponding to the regional bioeconomy and supported with an overall sum of 13,1 billion UAH[20].
- Clean environment, including also a total of 56 projects, from which 33 are directed towards bioeconomy with an overall sum of 1,4 billion UAH[21].

The analysis regarding the generation of innovative financial instruments and specific allocation of resources to each one of the actions already planned will take place in the following months as actions of the roadmap definition.

Step 6 and 7: Drafting strategy, presentation and feedback

The first draft of the Bioeconomy Strategy was presented on May 19th, 2020 to all FSC members and was open for their feedback. During the same month the strategy draft was introduced to POWER4BIO partners during the cross-visit of Lviv, organised in the framework of WP6, collecting recommendations and comments. Due to the comments and suggestions received, the RBH will held several meetings with regional stakeholders to further discuss and formalize the draft.

[20] Equivalent to approximately 389 million Euros (subject to exchange rate changes).

[21] Equivalent to approximately 41,9 million Euros (subject to exchange rate changes).

Step 8: Final strategy

The Smart Specialisation Strategy (Bioeconomy Strategy of Lviv) will be finalized after allocating estimated financial resource from the total available at regional level to each one of the planed actions as well as, a more detailed appointment of the institution responsible for carrying them out (see Table 7). Finally, the drafting group will generate a consolidated version that integrate received comments and share it with all interested actors before the finalization of strategy process.

Lviv´s Participatory approach and stakeholder engagement

Regarding the participatory approach of Lviv, the stakeholder's involvement to the process presented difficulties during the early stage, mainly due to lack of awareness about bioeconomy concept. The FSC built upon its existing network and reached out to external stakeholders, who have been previously involved in common projects or initiatives. Additionally, the so-called snowball technique was used, contacting potentially relevant actors based on personal recommendations of the existing FSC members. The activities and planned meeting to generate spaces of discussion with regional stakeholders were increased as a strategy to cope with the lack of awareness about bioeconomy and several regional events were attended by steering group members to present and discuss the strategy development initiative. Main meetings, workshops and stakeholders exchange are as presented in Figure 5.

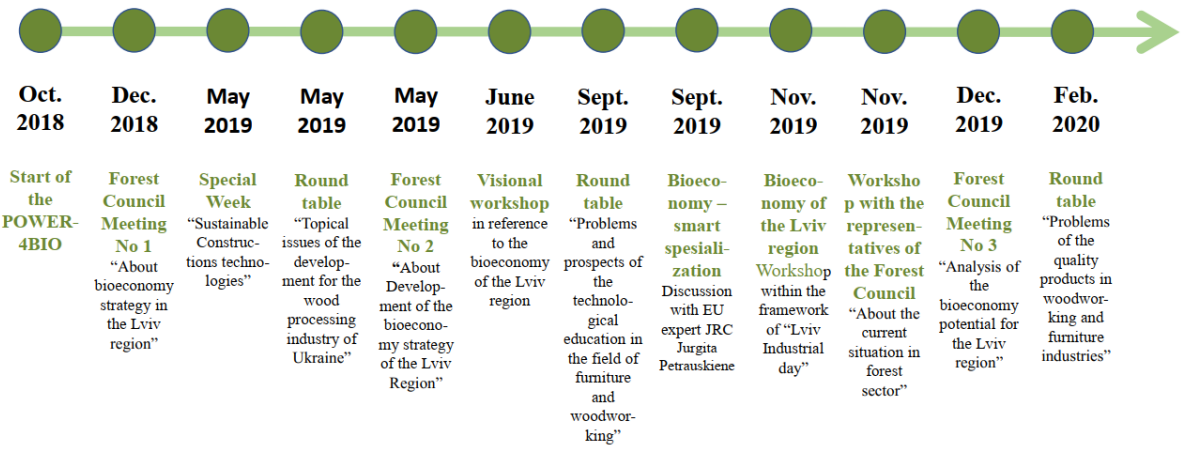

Figure 5: Participatory approach activities. (Lviv illustration)

Mazovia Region, Poland

Regional profile

The region of Mazovia hold a great potential for the development of their bioeconomy, specially for the development of rural areas through strengthening local specializations and diversifying economic activity. Increasing the share of products with a greater added value will be possible through developing an agri-food industry making use of local resources. Agricultural and forest residues and resources, waste water treatment and sludge, municipal waste and energy crops are the main biomass resources considered by the region for the development of their bioeconomy. Enhancing the connection and

symbiosis of the chemical and waste management industries with agriculture. Further detail of Mazovia profile are summarized in Table 9.

Mazovia region, Poland		
Total population (2018)		5,391,813
Total area in km²		35,558
Gross Domestic Product million[22] EUR		467,167
Gross Regional Product million EUR		24,453
Regional employment	N° people	%
in agriculture[23]	230 000	9.2
in forestry	-	-
Regional use of land (2018)	ha	%
agriculture	2,410,864	67.8
forest	835,624	23.67
Main regional industry[24]		
Regional biomass availability (2017)		
Municipal waste t		1,776,953.12
Biodegradable municipal waste Mg		95,228.51
Municipal sewage sludge Mg		75,125.17
Biodegradable non-municipal waste Mg		867,448.71
Bioeconomy baseline and energy potential	Mote	GJ
forestry	0,179	7,497,791.95
waste wood	0,008	340,766.38
hay	0,221	9,272,947.20
straw	0,027	1,132,878.40
agricultural biogas	0,006	257,559.34
biogas from wastewater treatment	0,028	1,190,125.80
biogas from municipal waste	0,112	4,710,462.95

Table 9: Profile of Mazovia region, Poland

[22] Eurostat 2019 https://ec.europa.eu/eurostat/documents/2995521/9618249/1-26022019-AP-EN.pdf/f765d183-c3d2-4e2f-9256-cc6665909c80

[23] Regional Statistics of Poland https://stat.gov.pl/en/regional-statistics/

[24] EURES Regional Data https://ec.europa.eu/eures/main.jsp?countryId=PL&acro=lmi&showRegion=true&lang=en&mode=text&regionId=PL0&nuts2Code= &nuts3Code=null&catId=2794

			
Agriculture	Manufacturing	Storage and transport	Automotive repair industry

Since 2011, the Energy Agency of the region established the Mazovia Energy Efficiency Cluster, which include representatives from the government, research centers, small and medium enterprises, advisory institutions, and non-governmental organizations. The basic step for the creation of the RBH was the meeting between the Cluster and the participants of POWER4BIO project to agree about the creation of the regional bioeconomy hub (RBH).

Consequently, RBH is considered as an extension of the Cluster and builds upon its experience and network: the members of the Cluster became also the members of the RBH. Additionally, based on networking from conferences seminars and previous Cluster projects, the RBH searched to involve external actors and conducted face-to-face meetings and telephone talks.

Step 1: Regional administration support

The initiative of Mazovia region bioeconomy strategy is a good example of a mix approach, which respond to an interest from the regional government, while allowing the development of the strategy from the initiative of industry and academia stakeholders. The Mazovia Energy Agency, has represented thought the strategy process, not only the adjacent Mazovia Energy Efficiency Cluster, but has been entrusted by the Board of the Mazowieckie Voivodeship to represent regional development potential and needs concerning bioeconomy in the POWER4BIO project. The willingness of the regional administration from the beginning of the process has been key for its rapid development.

Step 2: Forming steering group

The development of the bioeconomy strategy was initiated by the Mazovia Energy Agency and the Regional Administration in cooperation with the Mazovia Energy Efficiency cluster and the POWER4BIO partners. Thus, as a first action, the RBH was established, providing the cooperation platform to stakeholders and coordinating the strategy development process. An organizational meeting was held in May 2019 by the RBH members to establish the core group responsible for the strategy development and logistics.

The RBH stakeholders delegated the coordination of the process as well as strategy drafting to the management team – a steering committee – conformed by the Department of Agriculture and Rural Development and Department of Waste Management, Emissions and Integrated Permits of the Marshal's Office representing the policy makers. Also took part in the steering committee the Institute of Technology and Life Sciences, Warsaw Branch, Faculty of Engineering of the University of Technology and Commerce and the Institute of Rural and Agricultural Development of the Polish Academy of Sciences as representatives from the academia and finally food industry representatives, waste treatment companies and members of the Bioeconomy Association.

Step 3: Determine key aspects

Following the organizational aspects and definition of responsibilities (step 2), the RBH organized a visioning workshop in June 2019, with all interested stakeholders to clarify actors' vision and expectations of bioeconomy. Results of this experts workshop also included an analysis of key factors influencing the bioeconomy development (technological, economic, administrative, political, social) and an initial identification of regional challenges to the bioeconomy within a SWOT analysis. The results were there complemented by the analysis of Key factors, received by the region from Task 5.2 activities, the analysis of best practices using D3.3, D3.4 and D4.1 related to use of biomass residues resources of importance for Mazovia. Also were taken into account legal regulations at the national and EU level, high potential of the voivodship in the field of bioeconomy, regional conditions - spatial, environmental, social as well as existing scientific, production and service facilities, and strategic goals of Poland and the Mazovian region.

Drivers, challenges and goals of new bioeconomy strategy

While the regional authorities are driven by the economic development and job creation, new business opportunity are the drivers for many industrial stakeholders to join the RBH and the strategy development process. Likewise, the region is directed towards its sustainable development and therefore considered the sustainable use and allocation of resources within its regional bioeconomy analysis.

As for the challenges, they include lack of interest in environmental issues both on the part of experts and the general public, which highlights the need for the environmental education in society. The lack of regional economic resources put additional obstacle and hinder the stakeholders' motivation to be involved in the RBH. Thus, part of the crucial actions that the region expects to undertake in the near future is the introduction of environmental education and informational campaigns regarding the sustainable biological resources, as well as the availability of innovative solutions in the region. Furthermore, the RBH members together with the regional authorities expect to coordinate the development of the bioeconomy policies with the research community. Other key challenges identified for the regional bioeconomy include selective collection of municipal waste the reduction of biogenic residues send to final disposition (unused waste), introducing the principles of circular economy, further development of energy production from renewable sources, and promoting the innovative solutions - ecological industry and eco-innovation- between others. Assuring an existing infrastructure, Consulting, Finance and the fiscal system as well as coherence of policy related to scientific development with economic policies, information and modern communication are key factors to tackle regional bioeconomy challenges.

In order to secure political support and avoid inconsistencies in strategic planning and funding programs in the region, a close integration of the bioeconomy with existing strategies and development programs is essential. Table 10 provides an overview of important legal and strategic frameworks to be included in the development of the bio-economy.

Most relevant policy framework considered during Mazovia´s bioeconomy strategy development	
Policy, strategy, regulation	Main aspects considered for Regional Bioeconomy Strategy
The National Development Strategy 2020	emphasizes the need to develop a competitive and innovative economy and to level out regional development disparities
Strategy for sustainable development of rural areas, agriculture and fisheries for the years 2012-2020	improving the quality of life in rural areas and the effective use of their resources and potentials, including agriculture and fisheries, for the sustainable development of the country
The strategy of innovation and efficiency of the economy	promoting the increase of the productivity of the economy, rational management of resources, increasing the innovativeness of the economy
Strategy Energy security and environment - perspective until 2020	promotes the increase in the efficiency of the use of natural resources and raw materials
Strategy for Responsible Development until 2020 (with a perspective until 2030)	defining key areas for the implementation of the strategy, including: human and social capital, agriculture, environment and energy
National Strategy of Regional Development	assumed innovative development of regions and improvement of the approach based on Regional Smart Specializations
The national smart specializations	relates to the bioeconomy
Development strategy of the Mazowieckie Voivodeship until 2030. Innovative Mazovia	Development of export-oriented production in the industry of advanced and intermediate technologies as well as in industry and agri-food processing Increase of the region's competitiveness through the development of economic activity as well as the transfer and use of new technologies Improving the accessibility and territorial cohesion of the region and shaping the spatial order Improving the quality of life and using human and social capital to create a modern economy Providing the economy with a diversified energy supply with sustainable management of environmental resources; Using the potential of culture and cultural heritage as well as the values of the natural environment for the economic development of the region and improvement of the quality of life.
Regional Innovation Strategy for Mazovia until 2020	systems for monitoring crops / breeding, the course of the production and packaging process, systems for assessing the quality

	of raw materials and products (including agri-food sector, IT sector, information and communication technologies, photonics, electronics, chemistry, biotechnology, electromechanical sector), production automation and robotization, precision agriculture (including agri-food sector, IT sector, information and communication technologies, photonics, electronics, electromechanical sector); living organisms used in the production process (including agri-food sector, biotechnology); packaging (including agri-food sector, chemical sector, nanotechnology); logistics, supply cycle management, warehousing (including agri-food sector, IT sector, information and communication technologies, B2B services); quality classification systems (including agri-food sector, B2B services); equipment for quality assurance and testing (including agri-food sector, chemical sector, medical sector, nanotechnology, photonics, electronics); crop protection measures and techniques, veterinary agents, biopesticides (including agri-food sector, chemical sector, medical sector, biotechnology); management of by-products of agri-food production and processing, closed-loop solutions (including agri-food sector, energy sector, chemical sector, biotechnology, nanotechnology, B2B services); (among others)

Table 10: Most relevant policy framework considered during Mazovia´s bioeconomy strategy development

Step 4: Define priority areas

As a result of step 3, the definition of priority areas has taken place, based on the regional bioeconomy vision agreed in the visioning workshop and formulated as following:

Mazovia will become a region:
• with a significant share of the use of biomass in the development of a circular economy,
• developing in accordance with the principles of sustainable development,
• in which innovative bioeconomy technologies and associated industries will be developed, enabling the bioeconomy's efficiency to be increased,
• economically competitive, with an environmentally conscious society.

To achieve the vision, seven priority areas have been selected on the basis of the current regional needs and biomass resources as well as the existing research and development facilities as detailed in Table 11.

Priority areas and specific actions for Mazovia´s bioeconomy strategy	
Effective management of re-sources in accordance with the principles of sustainable development	• Rational use of agricultural production space, sustainable management of soils and waters; Improving the quality and availability of consultancy services and activities for integration and transformation of the agri-processing sector, as well as the effective use of funds from the Common Agricultural Policy or the European Regional Development Fund. • Increase the role of forests and forest management in mitigating climate change. • Waste management, including food waste and other biodegradable waste; post-consumer waste; sewage sludge.
Increasing the use of renewable biological resources in sectors creating high added value	• Processing of agricultural crops and animal products • Wood sector • Medical sector • Biotechnology, chemical and environmental protection sectors
Use of innovative biotechnological processes for the production of bioproducts	• Advanced biomass processing for specialized chemical products • Bio-based products and specialty chemicals • Application of innovative biotechnological methods in environmental protection
Energy sector	
Contribution to the implementation of climate policy	• Reduction of greenhouse gas emissions and CO2 bio-sequestration • Production of energy from renewable sources

Strengthening the research potential of scientific units and developing co-operation in business-science-environment relations	
Shaping and promoting pro-environmental and pro-health behaviour of consumers	

Table 11: Priority areas of Mazovia´s bioeconomy strategy

Based on the vision and the seven priority areas, the RBH experts worked on the strategy document. Yet, as the economy undergoes dynamic changes, the strategy document foresees evaluation and monitoring of its progress. Thus, the ad hoc evaluation be carried out if the monitoring of the strategy shows significant deviation from the established goals. The independent ex-post evaluation is planned to be conducted at the end of the 2030 to determine the effectiveness of the strategy implementation, including an assessment of the use of funds, effectiveness and efficiency of the financial aid as well as its impact on the development of the region.

Step 5: Define enabling mechanism and resources

Overall, once adopted, the strategy is expected to be financially supported by the national and regional programs, including the Smart Specialization Strategy. For the next programmatic period, it will be necessary to develop a new generation of Regional Smart Specialization compatible with the bioeconomy development strategy. Additionally, the financing of the bioeconomy strategy will rely on public-private partnerships and tax mechanisms.

However, specific assignment of financial resources and mechanism from the national and regional level to each planned activities are to be defined in the course of roadmap definition, which has already started in Mazovia region.

Step 6 and 7: Drafting strategy, presentation and feedback

As for the drafting of the strategy, the interested RBH stakeholders organized themselves in expert working groups to conduct research and writing of the strategy and an expert advisory group of experts in various fields related to the bioeconomy. Working groups were defined as follows:

- Working group on agricultural raw materials and their processing, connected to the regional administration for necessary information
- Working group on forest raw materials and their processing
- Working group on bio-waste and their treatment
- Working group for the development of the Mazowieckie voivodship, which counted with the support of Mazovian Regional Planning Office.

Up to date, the regional bioeconomy strategy is developed (in Polish language) and the focus is placed on agricultural waste, municipal waste and sewage, which were assigned as main priority areas. Currently, the document undergoes the consultation process, with a draft of the document published on

the website of the Mazovia Energy Agency for comments from the general public. The RBH members also received the electronic copy of the draft and could give their feedback either during the RBH meeting held specifically in form of an open discussion or sent their suggestions via e-mail.

Step 8: Final strategy

This step will be reached as the consultation process finalises and a final draft is approved by the public administration. Furthermore, a detailed roadmap is to be concretized to enable the successful implementation of the bioeconomy strategy. However, Mazovia region has already

Mazovia´s participatory approach and stakeholder engagement

During the drafting stage, the management team reached out to a wider number of experts including representatives of the regional authorities, research and development sector, municipal enterprises, associations and foundations working with biomass, as well as agriculture and the food sector. This was done mainly through personal calls, and emails, while also including the information already discussed by stakeholders during RBH establishment in two workshops during May 9th and June 27th of 2019. The experience of the Mazovia bioeconomy strategy shows that in-person workshops serve as the most effective method to engage the stakeholders, especially during the discussion of the draft document. Mazovia experience also shows that openly determined internal rules and schedule of the RBH meetings, as well as clear organizational structure serve as additional drivers and benefit the stakeholders' participation.

Similarly, to the Lviv region, the lesson learned from the Mazovia's bioeconomy strategy development point out to the importance of involving the regional authorities. This assures not only for future strategy implementation and the financial support, but also a better access to information for other RBH stakeholders. Another lesson to consider is the inclusion of demographic trends into the bioeconomy discussion, as it allows the stakeholders to have a wider picture of the environmental impacts and motivates them to work towards a more sustainable economy. Finally, the niche industries should be given special interest and support as they have the potential to bring a competitive advantage to the region in the future.

Nitra Region, Slovakia

Regional profile

The region of Nitra is a highly rural region with 339 rural municipalities (95.8 %) and the lowest urbanisation rate at regional level in Slovakia (45.6 %). The economy of the regions is hold mainly on two pillars: high agriculture production of wheat, rye and vegetables, and the automotive industry present in the region (Jaguar Land Rover Nitra). Further information about Nitra´s profile have been summarized in Table 12.

Nitra region, Slovakia	
Total population	676,672

Total area in km²		6,343.94
Gross Domestic Product million[25] EUR		84,851
Gross Regional Product million EUR		8,248
Regional employment [26] (2018)	Nº people	%
in agriculture, forestry and fishing	6,971	3.9
Regional use of land (2017)	ha	%
agriculture	464,398	73.2
forest	96,952	15.3
Main regional industry[27]		
Regional biomass availability (2017)		
Wood in t		354,35
Crops in t		1108,27
Crops residues in t		1237,28
Municipal waste in t		314,739
Bioeconomy baseline and energy potential	Nº plants	Capacity MW
Biogas	15	11,19

Table 12: Profile of Nitra region, Slovakia

				
Agriculture	Engineering	Chemicals	Automotive manufacturing	Food Industry

The proposed framework for the development of the bioeconomy in the Nitra Region focuses on the possibilities of increasing the efficiency of agriculture and the development of food production in the Slovak Republic so as to significantly reduce dependence on their imports. Currently efforts have been directed to the update of RIS3 strategy, a newly defined waste management program for the Nitra region and the *Programme of the Economic and Social Development of the Nitra region 2020+ (PESD). The regional bioeconomy strategy of Nitra will be included within in the new strategic document of PESD* (under development) and will be implemented by the regional government.

[25] Eurostat 2019 https://ec.europa.eu/eurostat/documents/2995521/9618249/1-26022019-AP-EN.pdf/f765d183-c3d2-4e2f-9256-cc6665909c80

[26] Slovak Investment and Trade Development Agency (SARIO) 2018. Percentage calculation is based on total number of economically active persons in Nitra region: ttps://www.sario.sk/sites/default/files/content/files/Nitriansky_kraj_v_cislach_2018.pdf

[27] EURES regional data https://ec.europa.eu/eures/main.jsp?catId=2810&acro=lmi&lang=en&countryId=SK&regionId=SK0&nuts2Code=SK02&nuts3Code=SK023&regionName=Nitriansky%20kraj

Step 1: Regional administration support

At the national level, the Slovak bioeconomy action dates back to the establishment of the Bioeconomy Cluster in 2015. As for the regional bioeconomy activities, the cooperation between the Slovak University of Agriculture in Nitra, National Agricultural and Food Centre and Bioeconomy Cluster gave path to the *National Platform AgroBioFood Nitra*, created in 2016. Two years later in 2018, the Bioeconomy Cluster in Nitra initiated establishment of the *Platform for Bioeconomy in Slovakia*, which received the official support from the national government and included national stakeholders since 2019. Thus, in 2019, the creation of the Nitra's Regional Bioeconomy Hub (RBH) was built upon solid bases and previous successful cooperation between the relevant stakeholders. However, the RBH primarily aimed to contribute to the national bioeconomy strategy and, as a parallel activity, develop the regional bioeconomy within the framework of the existing regional documents.

Step 2: Forming steering group

Two important and interlinked processes happen simultaneously at the national and the regional levels, both involving the Nitra region, and influencing the multi-level governance structure for the regional bioeconomy strategy. Thus, at the national level, the Ministry of Agriculture and Rural Development of the Slovak Republic (MARD) leads the update of the RIS3 strategy a (domain: healthy food and environment). With the help of the external agency, which organizes consultations and workshops, the Ministry involves representatives of research institutions, state and private companies as well as regional governments to discuss the content of the RIS3. Simultaneously, the Ministry contracted the Bioeconomy cluster (BEC) to work on the proposal of the national bioeconomy strategy. Thus, BEC conducts bioeconomy assessment, analysis of other relevant policy documents as well as involves a wide range of interested stakeholders into the process via online consultations or public meetings.

Similar processes are conducted at the regional Nitra level, where the self-government of the Nitra region is involved in the update of the regional RIS3 strategy. The update process embraces scientific community, as well as professional associations and clusters such as Plastic cluster, Bioeconomy cluster, and key private companies in region. The Nitra's RBH is also part of the process. Additionally, another strategic document – *Programme of the Economic and Social Development of the Nitra region 2020+ (PESD)* – is currently being prepared by the regional government. Thus, in view of the context, the Bioeconomy cluster, the RBH and the BIOEAST initiative see the opportunity to develop the proposal of the regional bioeconomy strategy and integrate it with both the RIS3 and the PESD.

Overall, as noticed by the Nitra RBH, the bioeconomy topic brings changes in the collaborative approach between policymakers. At the beginning, as the bioeconomy was quite an unknown field, it has been strictly sectoral issue of the Ministry of Agriculture and Rural Development. Nowadays, there is an understanding that the bioeconomy requires a cross-sectoral interaction. As a consequence, the other relevant institutions such as for example, the Ministry of Environment are involved to join working groups and discussions on bioeconomy, which improves the general communication culture between governmental bodies.

Regional and national actors within the governance structure are:

National actors (management)

- Ministry of Agriculture and Rural Development of the Slovak Republic

- Ministry of Education, Science, Research and Sport of the Slovak Republic
- The Ministry of the Environment of the Slovak Republic
- Ministry of Investments, Regional Development and Informatization of the Slovak Republic (new, since 2020)

Key regional actors

- Nitra Self-governing region
- Bioeconomy cluster
- Slovak University of Agriculture in Nitra
- National Agricultural and Food Centre
- Agroinstitute Nitra (State Enterprise)

Step 3: Determine key aspects

The determination of key aspects in need of strategic actions have been supported by an active work on the regional bioeconomy impulse. Strategic documents at national and regional level, as well as the visioning workshop carried out in of 2019 in the framework of Task 5.1 in POWER4BIO have contributed to identify key sectors for the development of the bioeconomy as well as major challenges to be tackle. While the resources developed in other WP for the regional strategy have been consulted by regional representatives, at this stage still to be specifically used for a potential stand-alone bioeconomy strategy. However, have already serve been revised for the recently updated Smart Specialisation Strategy of the region.

Drivers, challenges and goals of new bioeconomy strategy

The development of bioeconomy strategy in the Nitra region are impulse by important strategic initiatives (currently BIOEAST an POWER4BIO), and strategic documents at the national level. These include recently updated national RIS3 strategy – domain Healthy food and healthy environment-, Strategic Plan of the Common Agricultural Policy (2021-2027), Greener Slovakia – Strategy of the Environmental Policy of the Slovak Republic until 2030, Low-carbon strategy of the Slovak Republic until 2030 and Strategy of economic policy of the Slovak Republic until 2030. Likewise, specific regional regulations and programs have been consulted and used as based of analysis as listed in Table 13.

As for the challenges, bioeconomy requires cross-sectoral approach in governance, which is still a new concept for the regional and the national authorities. Yet, the engagement in workshops and meetings with different stakeholders brings positive changes to governmental communication and cooperation approach. Thus, the division of work areas between ministries and public institutions is step-by-step substituted by mutual cooperation on the common and intersecting topics such as bioeconomy.

Apart from the public entities, other challenges are also related to the involvement of stakeholders from agri-food sector, lack of skilled people in the area of bioeconomy and a low level of openness towards innovations and, as a consequence, a low level of bioeconomy awareness. To tackle these challenges, the region is currently seeking for clear and measurable methods to explain added value of bioeconomy solutions (not only economic) to the citizen and the relevant stakeholders.

Most relevant policy framework considered during Nitra´s bioeconomy strategy development	
Policy, strategy, regulation	Main aspects considered for Regional Bioeconomy Strategy
Programme of the Economic and Social Development of the Nitra Region (PESD) 2016–2022	Serves as an umbrella document for a wide range of regional strategies, including Strategy of Rural Development in Nitra region, Community-led Local Development (CLLD) Regional Strategy, etc. It includes the principles of circularity, through areas of sustainable growth and waste management
Research and Innovation Strategy (RIS3)	Recently updated and identified possibilities for the national and regional bioeconomy potential with emphasis on agricultural and food production as well as on the development of bio-based plastics for automotive industry.
Waste Management Programme of the Nitra Self-Governing Region.	It is a programme document developed by the District Office of Nitra. The targets of the waste management are to achieve increased waste recycling, particularly for municipal waste and construction waste; to apply best available techniques and environmental practices; and to minimize the negative effects of the generation and management of waste on human health and the environment.
Programme to Support Integrated Rural Development LEADER NSK	Unique instrument that provides funding for small-scale projects in the Nitra Self-Governing Region (NSGR), in Slovakia. It is based on the principles of the generally-known EU initiative LEADER, but it does not use any EU funding; it is funded entirely from the own budget of the NSGR.
Rural Development Programme of the SR 2014 -2020	This Programme aims to increase of competitiveness of agriculture and forestry sectors whilst ensuring the appropriate management of natural resources and encouraging climate friendly farming practices and to protect biodiversity, soil and water resources. The Programme also focuses on boosting the rural economy through investments in enterprises, including innovative cooperation projects, infrastructure and human resources via training, advisory services and local services to the population, including integration of marginalized communities. In order to achieve these objectives, the Programme focuses on the following priorities: knowledge transfer and innovation; competitiveness; food chain; ecosystems management; resource efficiency and climate; social inclusion and local development.

Table 13: Most relevant policy framework considered during Nitra´s bioeconomy strategy development

Step 4: Define priority areas

The regional bioeconomy vision has been defined with the following statements in June 2019:

> ***The RBH Nitra in cooperation with BIOEAST and Bioeconomy Cluster will:***
>
> - ***stimulate the creation of appropriate conditions (of the whole regional ecosystem) for the development of bioeconomy in Nitra region,***
> - ***offer the access to actual knowledge, information and best practices from different parts of the EU,***
> - ***Circulate the best practices, which are utilizable in the Nitra region.***
>
> ***"Nitra - the Region with a Flavour of Bioeconomy".***

The visioning workshop brought the stakeholders together to define the priority areas with the highest potential to achieve the vision. These areas are attached to the available biomass resources and existing industries, as well as to the regional needs. Furthermore, more recently during the cross-visit (organised in the framework of WP6), priority areas have been discussed with regional stakeholders and the partners of POWER4BIO. The proposed priority areas focus on local food system, circularity of the biomass production, sustainable use of the natural resources and the environmental education at the regional level (Table 14)

Priority areas and specific actions for Nitra´s bioeconomy strategy	
Resilient and healthy local food systems	• to improve the resilience, safety, security and added value of local food systems providing healthy food
Biomass-based circular production systems	• to foster innovation and ensure the long-term sustainability of circular production systems based on biomass
Society in the environment	• to support innovative knowledge-based land use change and the transition to a green economy
Sustainable natural resources (soil, water, air, biodiversity, ecosystems)	• to ensure quality and sustainability of natural resources, including biodiversity and ecosystems

Table 14: Priority areas of Nitra´s bioeconomy strategy

Worth mentioning that previously the Slovak Ministry of Agriculture and Rural Development (MARD) classified the main sectors of the bioeconomy in terms of employees and economic yields and defined five most productive areas, which are the food production, the agriculture, the forestry, the wood and furniture industry and the pulp and paper industry. Together these production areas account for more than 90% of bioeconomy turnover in the country.

Due to the available regional research facilities such as the Slovak University of Agriculture in Nitra (SUA) and the National Agricultural and Food Centre (NAFC) as well as the production potential, the

Nitra region placed its focus on food and agriculture sectors. The region aims to make its contribution and reverse the negative balance of food imports to the Slovak Republic with fundamental and long-term measures. Currently, the Slovak Republic consumes less than 50% of its own food production, ranking the lowest among the EU members.

The updated RIS3 will introduce changes to the regional development policies and will imply modification in the Programme of the Economic and Social Development of the Nitra region (PESD) with time horizon until 2030. It is foreseen that the measures dedicated to bioeconomy priority areas will be defined in new version of the PESD in line with other national strategic document such as Strategic Plan of the Common Agricultural Policy (2021-2027), Greener Slovakia – Strategy of the Environmental Policy of the Slovak Republic until 2030, Low-carbon strategy of the Slovak Republic until 2030, Strategy of economic policy of the Slovak Republic until 2030.

Step 5: Define enabling mechanism and resources

Nitra has identified available resources and mechanism to support their regional bioeconomy strategy and the fulfilment of bioeconomy goals, which still to be assign within a roadmap definition in the following months of the project. Thus, considering the regional RIS3 strategy, which foresees the establishment of the Regional Development Fund (RDF) as a direct financial instrument to support entrepreneurship in Nitra. The utilisation of the RDF financial mechanisms would be also available for bioeconomy projects, encouraging in this way the bio-based industry.

Additionally, the RBH members, mainly the Slovak University of Agriculture in Nitra in cooperation with the regional authorities elaborated the *Waste Management Programme*, which is directly related to the bioeconomy topics and facilitates the funding to the small-scale regional projects in this field as well as the PESD under update until 2030: *Smarter and Better Nitra region*. Furthermore, the LEADER NSK initiative provides funding also for implementing small-scale projects to support circular economy in rural areas. It is as an innovative and successful instrument reflecting local needs through the "bottom-up" principle. Implementation of the LEADER NSK is guided by the Guideline for Administration of Funding from the Budget of the Nitra Self-governing Region to Support Implementation of Community Led Local Development – CLLD Strategies of Local Action Groups.

Step 6 and 7: Drafting strategy, presentation and feedback

Both these steps have not yet taken place for a stand-alone bioeconomy strategy, which is still a possibility under analysis for Nitra region – following the recent update of regional RIS3 strategy.

Step 8: Final strategy

This step has not yet been reached. It´s completion is subject of current developments within National Bioeconomy Strategy of Slovakia and regional initiative for a stand-alone regional bioeconomy strategy in NSGR.

Since July 2020, a new Ministry of Investment and Regional Development and Informatization of the Slovak Republic has been established at the national level. These changes are translated into the ad-

justment of Regional Development Strategies and, consequently, of the regional bioeconomy development. Especially in times of COVID-19, the regional stakeholders, including the Nitra RBH, prioritize to focus on reorganizational issues concerning the new ministry and hold talks policy changes and the distribution of economic resource. Once the reorganization is concluded, the work on National Bioeconomy will be reassumed.

Nitra´s participatory approach and stakeholder engagement

The participatory approach used both at the national and regional levels is the involvement of stakeholders via workshops and focus groups. As the country is relatively small, the same actors tend to participate in various projects and initiatives which provides a good networking and trust between stakeholders. The challenges are mostly related with the online participation, due to the legal restriction on technology use for the regional authorities as well as difficulty of finding the technology suitable for all participants. Additionally, the feedback is much more difficult to obtain using online tools instead of face-to-face meetings.

On the national level, the Nitra's RBH is in constant communication with the Ministry Agriculture and Rural Development. In March of 2020, the Ministry of Agriculture and Rural Development established the *Slovak Centre for Bioeconomy*, a legal public entity entitled to prepare the national bioeconomy strategy in collaboration with other bioeconomy actors, including the RBH Nitra region. However, it was unclear whether the country should have a separate bioeconomy strategy, or should it be a part of another strategic document, such as for example, the National Research and Innovation Strategy. The National Research and Innovation Strategy is currently being prepared by the EU experts, who also give recommendations regarding the national bioeconomy strategy. Based on the recommendation, the Slovak government decided that the country will not have a separate bioeconomy strategy. Bioeconomy is defined as a priority in the updated national RIS3 – within Domain 5: Healthy food and environment. Overlaps with other Domains are also identified. The final version is expected to be approved until March 2021.

In the meantime, the RBH of the Nitra in cooperation with the Slovak Centre for Bioeconomy, the National Bioeconomy Cluster and the Ministry of Agriculture and Rural Development are working on the document "*Slovak bioeconomy contribution to the Common Agricultural Policy 2021- 2027*". The draft of this document has been prepared and shared with the bioeconomy stakeholders at the end of 2019. In February 2020, the document has been discussed and approved by the National Bioeconomy Cluster.

South Bohemia, Czech Republic

Regional profile

The region of South Bohemia holds great potential for the development of regional bioeconomy mainly based in existing agricultural activities, agriculture biogas stations, biotechnology valorisation of agriculture and forest residues and unused municipal waste (bio-fractions). The Development program of the South Bohemian Region 2014 – 2020, considers as key the further development of facilities to

process biological degradable materials and further development of biotechnological research. A summary regarding the main biomass resources of South Bohemia region are included in Table 15.

South Bohemia, Czech Republic		
Total population		638,782
Total area in km²		10,057
(Country) Gross Domestic Product million[28] EUR		191,722
Gross Regional Product million EUR[29]		9,395 4,9% (of national GDP)
Regional employment[30],[31],[32]	Nº people	%
in agriculture, forestry and fishery	17 200* (*17269 / 10829 (AWU-Full time equivalent)*)	5,48
Regional use of land	ha	%
agriculture	415,915[33]	41.36
forest	379,061[34]	37,69
Main regional industry[35]		
Bioeconomy baseline and energy potential	**GJ/ year**	
Biogas from agriculture		**34,840,940**
Biogas from forestry		**2,156,779**
Biogas stations[36]		60

[28] *Eurostat 2019 https://ec.europa.eu/eurostat/documents/2995521/9618249/1-26022019-AP-EN.pdf/f765d183-c3d2-4e2f-9256-cc6665909c80*

[29] *CZSO South Bohemian Region - Regional account for 2017 https://www.czso.cz/documents/11256/115661448/vyvoj_makroek_2017_koment%C3%A1%C5%99.pdf/7a11972a-f887-4560-89a5-80b67ca8185c?version=1.2, for details see table attachment https://www.czso.cz/documents/11256/115661448/tab_makroekonomikaJHC.xlsx/b89a6839-f650-4233-b5da-a9f3a6d61cc9?version=1.2*

[30] *CZSO - Employment in South Bohemian Region in the year 2018 (*the number for common branch of Agriculture, Forestry and Fishery) https://vdb.czso.cz/*

[31] *Statistical Yearbook of the South Bohemian Region 2017 (Working persons in agriculture including forestry and fishery, total by region) https://www.czso.cz/documents/10180/46120827/1711114.xlsx/4d193641-caa0-4b4a-9351-e26dd278f330?version=1.3*

[32] *33 000 employees in forestry sector - Employment in forestry and forest-based industry – Czech Republic 2018 – data for 2016 https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=for_emp_lfs&lang=en*
137 860 persons employed in agriculture - Czech Republic in 2016 (Agriculture, forestry and fishery statistics – 2018 edition) https://ec.europa.eu/eurostat/documents/3217494/9455154/KS-FK-18-001-EN-N.pdf/a9ddd7db-c40c-48c9-8ed5-a8a90f4faa3f

[33] *Statistical Yearbook of South Bohemian region 2017 (Utilised agricultural land (hectares)) – data for the year 2016 https://www.czso.cz/documents/10180/45990431/330105171101.xlsx/1428fac8-ef13-4f52-ae87-bfb78c2f66ff?version=1.3*

[34] *Statistical Yearbook of South Bohemian region (Forest land) 2017 – data for the year 2016 https://www.czso.cz/documents/10180/45990431/330105171201.xlsx/b038f365-452e-4d1a-9ed5-7b377cc2f1be?version=1.1*

[35] *EURES Regional Data https://ec.europa.eu/eures/main.jsp?countryId=CZ&acro=lmi&showRegion=true&lang=en&mode=text&regionId=CZ0&nuts2Code= &nuts3Code=null&catId=2754*

[36] *Map of Biogas stations https://www.czba.cz/mapa-bioplynovych-stanic.html*

Biomass source (Calculation of technical potential of energy biomass in the South Bohemian Region) [37]	Technical potential [PJ/yr]
Dendromass (incl. already used)	10–11,0
Wood waste from the processing industry	0.5–1.0
Straw (cereal and rapeseed)	1.0–1.5
Plant based pellets (from various by-products / residual agricultural products)	0.4–0.6
Energy crops (Deliberately grown crops)	1.0–3.0
Biowaste	0.1–0.2
Total	~ 14–16

Table 15: Profile of South Bohemia region, Czech Republic

Agriculture	Food and beverages	Transport & manufacturing equipment

In October 2019, the RBH in South Bohemia held a meeting with its engaged stakeholders to discuss the opportunities for bioeconomy strategy, as well as legislative status of the RBH itself. The legal status is important for the RBH in order to participate in tenders and projects. The Group and the RBH members agreed to continue working on the regional bioeconomy strategy, which is currently at the visioning stage.

Step 1: Regional administration support

The support of regional administration is considered as in process for the South Bohemia region. The RBH cooperation with the regional government and interaction is limited. The RBH is in the process of building trust with the regional institutions and up until now, contributed with the expert input to the development of several regional strategies such as the Strategy of Regional Innovation and the Smart Regional Strategy. Additionally, at the national level, the RBH presented its comments and suggestions to the Bioeconomy Concept in the Czech Republic from the Perspective of the Ministry of Agriculture (2019-2024)[38]. The RBH members hope that such contributions would give more value to the RBH activities as well as provide opportunity to introduce bioeconomy topics into the regional agenda. In general, the South Bohemia region will most likely not develop the regional bioeconomy strategy due to the absence of a national bioeconomy strategy. It is unusual in Czech practice to go bottom-up, as

[37] *Territorial energy concept of the South Bohemian Region for 2018–2043.* https://portal.cenia.cz/eiasea/detail/SEA_JHC024K
[38] *Bioeconomy Concept in the Czech Republic from the Perspective of the Ministry of Agriculture (2019-2024)* http://eagri.cz/public/web/mze/poradenstvi-a-vyzkum/vyzkum-a-vyvoj/koncepce-a-strategie/koncepce-biohospodarstvi-v-ceske.html

there should be a national framework first. The Regional Innovation Platform for Bioeconomy and Circular Economy[39] was created in the framework of Regional RIS3 strategy of South Bohemia Region for 2021-2027. The RBH (represented by newly established *South Bohemian Association for Bioeconomy*) will lead this platform and sees it as a good opportunity to promote its activities and expand the bioeconomy community in the region[40].

Step 2: Forming steering group

The formation of a steering group is based on the RBH established in 2019. However, for a validated regional bioeconomy strategy it is still missing the involvement of the regional administration that can support coordinated actions and alignment of regional policies, and the final validation of the strategy.

In the meantime, the South Bohemian RBH was transformed to ***South Bohemian Association for Bioeconomy***. Formalization of expert group to the legal entity enable to be partner for the state/regional administration and to apply for grants and projects. The Association chose the assembly and the board and hold the first official meeting at the Faculty of Economics of the University of South Bohemia on September 15, 2020. The aim was to continue the work on bioeconomy strategy, revise current regional bioeconomy vision and start the process of defining priority areas for the fulfilment of that vision. The South Bohemian Association for Bioeconomy became the leading body in the Regional Innovation Platform for Bioeconomy and Circular Economy within the Regional RIS3 strategy to broaden the network of cooperation. Finally, the Association is currently also working on its involvement in the S3 thematic platform (Bioeconomy Pilot of the Vanguard Initiative) with observer status.

Step 3: Determine key aspects

The analysis of regional bioeconomy and the aspects that required the support of a coordinated bioeconomy strategy have initiated on May 2019, when the University of South Bohemia carried out a survey with the newly created RBH, to analyse the potential areas of development for the regional bioeconomy. This analysis, as in the case of the other CEE regions was complemented with the Visioning workshop, were an initial SWOT analysis was carried out with the regional experts from agriculture and forest sector, waste management companies, research institutes and academia as well as, representatives from regional smart specialisation strategy. This SWOT analysis was complemented by the one carried out in Task 5.2, and regional representatives have consulted additionally project resources (D3.3, D3.4, D4.1 and D4.2 and D4.3) for pending definition of priority areas.

Drivers, challenges and goals of new bioeconomy strategy

For South Bohemian region, bioeconomy is seen as an area of opportunities for the growth and revitalisation of rural areas – mainly to impulse existing agriculture activities –, the use of waste resources and utilisation of non-traditional biomass such as algae and hemp for the increase of bio-based product. Use of regionally produced biomass, while also enhancing food security and health regional are also main drivers for the strategy generation. Although the region experience a low maturity of its

[39] *Regional RIS3 strategy of South Bohemia Region for 2021-2027* http://www.risjk.cz/files/risjk/uploads/files/vystupy-projektu/15936853301-132-ris3-jk-aktualizace-ver-3062020-schvaleno-zk.pdf

[40] *Minutes – XV. meeting of the Commission for Innovation of the South Bohemian Region Sep 21, 2020. Resolution Nr. 7/2020 p. 6*

bioeconomy, the bioeconomy strategy is seem as an opportunity not only to coordinate existing actions that can be grouped under bioeconomy, such as circularity programs and bio-based start-up initiatives, but to connect with the national framework and networks on bioeconomy. Thus, generating promising opportunity for the region.

A great concern and current challenge to strategy development in South Bohemia is the recognition of regional administration of their key role in managing the main framework of the strategy development process. This appropriation from regional policy makers is considered as key for engagement and participation of other stakeholders, which are waiting for stable environment and the adequate policy and financial support. Furthermore, it has been highlighted within expert's discussion the need to assure sustainability while bioeconomy activities are implemented in the region and the need of specific directives from regional authorities to assure it.

For the forthcoming period 2021–2027 the bioeconomy becomes an integral part of regional strategic documents of South Bohemian Region. *Development program of the South Bohemian Region 2021–2027* declares support for research and pilot programmes in the field of energy supply, waste management, environment, bioeconomy and digitalization within the Priority axis 1 "Smart Region and competitive regional economy" and in the chapter "Development of education and support of active leisure time" is bioeconomy an important part of future project cooperation with academic sector. Other important documents are *Regional RIS3 strategy of South Bohemia Region for 2021-2027* and *Regional Appendix to National Research and Innovation Strategy (RIS 3) for the period 2021–2027* – this document brings probably the most important step, which is proposal of Regional Innovation Platform for bioeconomy and circular economy to identify the perspective innovation areas where to allocate private, regional, national and EU funds. Platform will involve stakeholders from public administration, industry, education and research branches. Its main function will be to identify and defend interests in this field, promote them at the national and European level and implement scientific research and technological innovation activities. At the same time, it will be another important element for strengthening the internationalization of the region. Bioeconomy and circular economy should serve as an important part of the regional specialization on biotechnologies for sustainable development of the society.

For *Strategic development plan of the Smart Region South Bohemia for the period 2019–2023* bioeconomy is one of the key aspects of several priority areas. In the priority area of the environment, this applies in particular to waste management – it assumes the use of residual outputs from forestry, pond farming, agriculture, food and municipal waste for further energy and other processing with high added value. The *Strength* part of the SWOT analysis of this area mentions implementation of projects developing the field of bioeconomy and the *Opportunity* is seen in the support of bioeconomic start-ups focused on products with high added value and new bioeconomic fields. The priority area *Effective Territorial Management & Innovation* will support the education of experts in the field of bioeconomy and creation of local bioeconomy strategies. It includes bioeconomy as a new field of study at the University of South Bohemia in České Budějovice and support of bioeconomic start-ups. In the framework of cooperation among cities, universities and scientific research institutions will be supported, as well as research and pilot projects also in the field of bioeconomy. Moreover, one of the criteria for evaluation of the project pipeline is to contribute to public awareness of the meaning and strategic benefits of the circular economy and the bioeconomy. On the national level there exist since July 2019 the first concept about national bioeconomy, generated by the Ministry of Agriculture of the Czech

Republic: The Concept of Bioeconomy in the Czech Republic from the Ministry of Agriculture point of view for the years 2019-2024[41].

Step 4: Define priority areas

This step is under development in the region. Updated version of the regional bioeconomy vision – *Vision of the South bohemian association for bioeconomy/ Regional innovation platform within the Regional RIS3 Strategy* has been defined with the following statements:

> *Closing of the ecological cycle containing water, soil and climate in landscape scale. An effort to build value chains on traditional resources and branches and link them with a new high - value added – technology able to ensure sustainability of development in the region. Emphasis on the linkages of all branches of regional bioeconomy - agriculture, forestry, waste management with non-traditional sources.*

Experts discussion within now South Bohemian Association for Bioeconomy (previously RBH) to define priority areas for the strategy development have started and consider in these early stage four focal sectors: forestry, agriculture, waste and non-traditional sources of biomass (e.g. algae).

Participatory approach and stakeholder engagement

As for the internal activities within the RBH, in January and March 2020, it conducted two seminars for its members. The seminar in January has been organised together with the Platform for Bioeconomy of Czech Republic and the aim was to give the RBH members a chance for networking with other bio-economy stakeholders in the country. The Platform for Bioeconomy of Czech Republic operates at the national level and has been founded originally by the University South Bohemia and the University of Agriculture in Prague one year before the BioEAST initiative. Both BioEAST Initiative and the Platform for Bioeconomy of Czech Republic hold common meetings and share a wide networking of bioeconomy stakeholders. The joint seminars with these institutions facilitate the introduction of the RBH members to the wider bioeconomy community, which already exists in the country. The seminar in March had a technical focus regarding the circular economy and conducted online. In the future, the RBH plans to continue building bioeconomy community, promote the RBH activities and work closely with Power4Bio counterparts to identify specific steps (policies) for bioeconomy initiatives and funding mechanisms for them.

Step 5: Define enabling mechanism and resources

This step will be carried out during following months. As previously mentioned, it is not clear whether a regional strategy might be generated by the end of the project, since a framework national bioecon-

[41] *Development program of the South Bohemian Region 2021–2027; Regional Appendix to National Research and Innovation Strategy (RIS 3) for the period 2021–2027; Strategic development plan of the Smart Region South Bohemia for the period 2019–2023; The Concept of bioeconomy in the Czech Republic from the Ministry of Agriculture point of view for the years 2019–2024.*

omy strategy is missing. However, the analysis of enabling mechanism and potential resources to support the development of regional value chains and potential pilot projects will be carry out as a preparatory analysis.

Step 6 and 7: Drafting strategy, presentation and feedback

These two steps have not been initiated. In the case that a regional bioeconomy strategy can not be validated by the regional government. The representatives of South Bohemia will draft a recommendations document, depicting all key analysis carried out during the strategy development process of POWER4BIO. This recommendations document will be presented and consulted with RBH members.

Step 8: Final strategy

In the case a regional strategy is not possible by the end of the project, a recommendation document for the regional bioeconomy in South Bohemia will be finalized after receiving comments of interested stakeholders from the RBH. Then, it will be submitted to the regional government as an analysis base, for a future development of the regional bioeconomy strategy.

Southern Great Plain, Hungary

Regional profile

For the Hungarian bioeconomy (and so the bioeconomy in the Southern Great Plain) agricultural wastes and by-products are essential, as agriculture is the biggest supply sector providing approximately 90% of the biomass. The Southern Great Plain regions holds 12% of the Hungarian forests according to data from Hungarian Central Statistical Office. Agriculture residues in the region are mainly from straw (from cereals, sunflower, rapeseed), grape stalk used to produce polyphenols, grape marc, wine lees used in animal feed, maize, between others. Forestry residues consist mainly of wood cuttings, orchards and vineyard pruning residues used for soil cover or energy purposes, woody or lignocellulosic biomass for generating electricity & heat, 2nd generation biofuels, cuttings of wood, logs, woodchips, sawdust, bark, used for energy production, insulation materials, animal bedding, extraction of chemicals. Furthermore, energy crops and industry residues (e.g. whey used for food industry, wastewater treatment sludge used for composting additive and biogas production) are also considered. Further details of Southern Great Profile are summarized in Table 16.

Southern Great Plain, Hungary		
Total population		1,2 million
Total area in km²		18,339
Gross Domestic Product million[42] EUR		124,050
Gross Regional Product million EUR		11,258
Regional employment	No people	%

[42] Eurostat 2019 https://ec.europa.eu/eurostat/documents/2995521/9618249/1-26022019-AP-EN.pdf/f765d183-c3d2-4e2f-9256-cc6665909c80

in agriculture	56,000	10 (of total employment) 5 (of total population)
in forestry	-	-
Regional use of land	thousand ha	%
agriculture	1,230	67
forest	240	13
Main regional industry[43]		
Regional biomass availability	Average yearly agricultural production in period 2012-2016	
Woody biomass by-products/waste in thousand m^3	133	
Total agricultural crops in thousand tons	5,575	
Industrial crops (oil seeds, soybean, sugar beet etc.) in thousand tons	530	
Grass from grassland in thousand tons	241	
Bioeconomy baseline and energy potential		GWh
Electricity from biomass and biogas[44]		2488

Table 16: Profile of Southern Great Plain region, Hungary

	
Agriculture	Forestry

The idea of bioeconomy strategy development arose in 2016 as a result of the cooperation between the Ministry of Agriculture of Hungary and the Hungarian Chamber of Agriculture in the BIOEAST initiative[45]. Since 2018, the Hungarian partner of the POWER4BIO project (Bay Zoltan Nonprofit Ltd - BZN) revitalised the idea of bioeconomy strategy. However, only the national bioeconomy strategy is under development and no regional strategies are planned. The descriptions hereafter, are mainly related to the national bioeconomy strategy process, which will have an effect on the regional bioeconomy development. Yet, certain information of the process cannot be disclosed in this report. As for the regional level, in the absence of a regional bioeconomy strategy, BZN has generated in parallel a recommendation to regional bioeconomy, presented to the organisers of the national strategy for consideration of the regional potential and strengths.

[43] EURES Regional Data Hungary https://ec.europa.eu/eures/main.jsp?catId=2769&countryId=HU&acro=lmi&lang=en&regionId=HU3&nuts2Code=HU33&nuts3Code=&regionName=Del-Alfold

[44] Yuzhakova, T., Rédey, Á., Lakó, J., Hancsók, J.,Domokos, E., & Somogyi, V., Utasi, A., Popita, G., Ráduly and, L., Ráduly, I. (2012). Biomass Potential in Hungary. Fresenius Environmental Bulletin. 21. 2356-2361.

[45] BIOEAST is a Central-Eastern European Initiative for Knowledge-based Agriculture, Aquaculture and Forestry in the Bioeconomy.

Step 1: Regional administration support

As in Hungary the regional (NUTS2) level administration does not exist, the only logical choice was to get support from the higher, national level administration. The Hungarian Bioeconomy Cluster has been involved in the Bioeconomy Strategy development at national level, thereby a continuous communication has been established between the Cluster and the relevant experts from the Ministry of Agriculture and the National Research, Development and Innovation Office.

Step 2: Forming steering group

The RBH in Southern Great Plain region was established during 2019 and organised two workshops (03.03.2019 and 05.04.2019) with the relevant players to discuss a further bioeconomy development. Additionally, in June 2019 the Hungarian Bioeconomy Cluster was founded with the aim of initiating and supporting bioeconomy-related developments. The RBH though acts within the Hungarian Bioeconomy Cluster and contributes on the progress towards the National Bioeconomy Strategy. Regarding the Cluster, it involves two main groups of stakeholders:

- Official members, including the academic sector, civil society, governmental representatives and business sector.
- External experts, who are being consulted on request.

As for the development of the national bioeconomy strategy, the national government has delegated two ministries – namely the Ministry of Agriculture and the Ministry of Innovation and Technology – to work on the National Bioeconomy Strategy, involving the Cluster's experts as well. The strategy is foreseen for the national level with the involvement of the regional stakeholders in the national process. In this way, the regional needs are expected to be considered in the national document. The role of the Cluster in this context is to involve regional stakeholders – including, the Southern Great Plain region – in the national strategy process, as well as to transfer the gained experience from the national to the local level.

Step 3: Determine key aspects

Several analyses have been made to define the aspects that require strategic actions:

- General socio-economic analysis
- Assessment of unique regional bioeconomy potential
- Assessment of knowledge and technology webs
- Analysis of the legal and political environment
- SWOT analysis

On 20.06.2019, BZN organised the visioning workshop of the Hungarian Bioeconomy Cluster and the Regional Bioeconomy Hub (RBH) of Southern Great Plain. Furthermore, the resources accompanying this step have been consulted, such as the catalogue of technology solutions (D3.3.) and their detailed descriptions in D3.4 and D4.1. Moreover, D4.2 and D4.3 and D4.4 have also been taken into account for the analysis of the region.

In general, the development of the National Bioeconomy Strategy goes in parallel with the elaboration of the Smart Specialisation Strategy, which allows for the policy coherence between both documents. As for the Cluster activities, the Cluster made analysis of the available bioeconomy and circular strategies – mainly at the national level – in different EU countries.

The lack of communication between relevant industry players and the governmental institutions is regarded as a main challenge for the national and also regional bioeconomy development in Hungary. The establishment of the Hungarian Bioeconomy Cluster aimed to provide an interaction platform for these stakeholders. Currently, the Cluster still has to clearly define its tasks as well as find and allocate the funding for its mediation role.

In order to secure political support and avoid inconsistencies in strategic planning and funding programs in the region, a close integration of the bioeconomy with existing strategies and development programs is essential. Table 17 provides an overview of important legal and strategic frameworks to be included in the development of the bioeconomy.

Most relevant policy framework considered for national and regional bioeconomy analysis	
Policy, strategy, regulation	Main aspects considered for Regional Bioeconomy Strategy
National Rural Strategy 2012 - 2020	The objective of the document is rural development and job creation based on sustainable utilization of local resources
National Waste Management Plan	Urges higher utilization rate in the case of biomass based by-products from food industry, agriculture and forestry
Food Economy Strategy 2016-2050	Highlights the necessity of sustainable and more efficient food production and the utilization of related biomass based by-products
National Smart Specialisation Strategy	Mentions biomass based products and energy production as markets with high potential
Hungary's National Energy and Climate Plan	Both documents foresee the rise of biomass based electricity and heat generation to replace/decrease the fossil based one
National Energy Strategy 2030	
National Sustainable Development Framework Strategy 2012-2024	Urges the use of sustainability criteria systems for strategy and sectoral regulation development processes
National Forestry Strategy 2016-2030	Highlights the role of forestry and wood industry in rural development and job creation, and encourage novel utilization solutions for forestry by-products
Second National Climate Change Strategy (2018-2030)	Mentions the replacement of fossil based energy production and the decarbonization as important intervention areas

Table 17: Most relevant policy framework considered for national and regional bioeconomy analysis

The following drivers have been identified as the most important ones for bioeconomy development:

- education and training programs involving secondary and higher educational organisations, internal and external experts, farmers and enterprises

- supporting public relation for awareness raising and an increase of demand for bioeconomy products in order to motivate and involve more enterprises into the bioeconomy activities
- import of knowledge from regions having more advanced bioeconomy
- indicator and monitoring system which allows for stakeholders to assess the biomass potential and follow up the evolution of the bioeconomy
- up-to date policy and legislation environment to develop fields of innovation (such as sewage utilization, insect-based feed and food systems, utilization of lignocellulosic feedstocks and dairy wastes etc.)
- dedicated bioeconomy focused financial instruments would significantly increase the number of bioeconomy related innovations.

Step 4: Define priority areas

Based on step 3, the main objective groups have been defined at the national level. The discussions within the Cluster highlighted agriculture, forestry and freshwater aquaculture as main sectors for the Hungarian bioeconomy. Based on it, five priority areas have been identified:

1. Production and application of freshwater algae as animal feed and fertilizer
2. Production of herbs, medicinal plants, to extract components with high added value
3. Production and development of hemp-based products
4. Utilisation of the lignocellulose content of the plants produced in agriculture and forestry
5. Utilisation of sewage as fertiliser or energy production

Unlike the development of the national bioeconomy strategy, the regional bioeconomy is at the visioning level. Thus, the regional vision is expressed as following:

> ***"to become a national leader in the regional bioeconomy development in Hungary by elaborating the regional bioeconomy strategy and through a collaborative approach between the most important relevant parties."***

This vision can be divided in two milestones, in particular the mid-term vision and the long-term vision. In the mid-term, the RBH in Southern Great Plain aim is to increase the engagement of relevant stakeholders and to become a communication bridge between them, focusing specifically on business sector being the stakeholder group expected to implement the bioeconomy solutions in practice. When it comes to the long-term, the RBH vision is to become the good example - in terms of bioeconomy strategy development and its implementation - to other Hungarian regions and to the whole country.

Step 5: Define enabling mechanism and resources

For the national strategy, the Cluster members concentrated on the importance of finding mechanisms and schemes to support the strategy implementation in the future. For that purpose, they carried out the analysis of funding mechanisms for rural development in research and innovation, which have been available in Hungary from 2007 to 2020. The output of the analysis is an excel table with information about tender calls, conditions, beneficiaries and the amount of funding granted.

With this analysis the Cluster members looked for the funding tools, which have been the most successful and suits the Hungarian context the best. The findings allow the Cluster to suggest to the Hungarian government about the possible effective funding instruments for the bioeconomy.

Step 6 and 7: Drafting strategy, presentation and feedback

Despite the fact that no bioeconomy-related development strategies will be elaborated at the level of regions or counties, the Cluster believes that it is of great importance to develop a summary considered as *bioeconomy recommendation material for the Southern Great Plain region*, hoping that it can serve as valuable input to the national strategy. This summary was discussed with the relevant regional and national stakeholders in mid-October.

At national level the Bioeconomy Cluster wrote the first draft of the strategy document considering all results derived from the participatory process and previous regional analysis. The drafted strategy proposal document has been sent to the relevant regional and national institutions/administration and bioeconomy related political and technical experts. An online meeting has been organized in order to get feedback in more details and to summarize the opinions gained from the stakeholders.

Step 8: Final strategy

At national level and after including the received feedback from the consultation process, the strategy proposal has been finalized by the coordinator. This step does not apply for the regional level.

Participatory approach and stakeholder engagement

The Hungarian partner representing the Southern Great Plain region in POWER4BIO organises events to connect the RBH and the Bioeconomy Cluster acting at national level to achieve more involvement of the external experts in the Cluster activities. One of these events has been conducted in February 2020. In general, the experts are informed about the Cluster activities via email, newsletters, the content on the cluster's webpage, etc.

The Hungarian Bioeconomy Cluster has built a stakeholders' database which is continuously extended. According to the experiences, a personal communication is the best way to contact stakeholders, followed by the online meetings, which also brought positive results. Instead, the questionnaires and surveys proved to be ineffective, due to the very low respond rates.

In general, the government closely follows the Cluster activity. Yet, currently, the governmental involvement became uncertain due to virus outbreak, also because legally allowed online tools provide only limited possibilities for representatives of these bodies to stay in touch with Cluster stakeholders. Specially it concerns governmental institutions that are not allowed to use platforms such as Skype or Zoom in their communication.

4 CONCLUSIONS

This report has presented a comprehensive description of the strategy development process per each one of the CEE regions. Their specific settings, such as regional policies, regional administrations and national relevance of bioeconomy have shaped their strategy development process. Maturity of bioeconomy earlier to the beginning of strategy development, as well as prior involvement of relevant bioeconomy stakeholders -existent networks and established trust relations among relevant stakeholders- have influenced the advance and contributed, in the best cases, in managing the numerous exchanges, coordination of actions and take of decisions necessary for a well-defined bioeconomy strategy. In other regions, which have not yet experienced the wide-ranging support of regional administration and its institutions, the strategy development has faced delays related to lack of cooperation and lack of a clear signal to regional actors that positions bioeconomy in the regional agenda.

The advance of each region on their strategy development has been followed based on the generated and advised methodology. However, as it is a methodology that offers flexibility in its application in the regions, it must be interpreted according to their framework conditions. The regions were enabled to carry out the application of the 8 steps, choosing the most suitable accompanying tools and resources for their individual situations. The experiences of WE POWER4BIO regions with regard to their bioeconomy strategies development, namely Piemonte, Andalucía, Bavaria and Flanders, have proven key as examples for the CEE regions of diverse possible paths to achieve coordinated actions toward a more developed regional bioeconomy. As well as, to include their lessons learned and ex post analysis of the strategy development process in the 8-steps methodology. Furthermore, the feedback from CEE regions along their strategy development process confirms key aspects already highlighted from the experiences in WE regions:

1) It is key to reach a transversal cooperation between several department of the regional government. This will facilitate to set a regional bioeconomy agenda that encompass efforts already in place – programs, strategies, regulations – and identify key areas still unattended to be included in the new bioeconomy strategy.
2) A multi-stakeholder's approach is essential from early stages of the strategy development, with a rich participatory approach. First, involving regional experts or knowledge-holders (e.g. sectoral clusters, industry representatives, technology parks, researchers and universities) constitutes a primary source of information to design the strategy, while support the identification of specific needs or conflicts to be tackle by the bioeconomy strategy. Second, it will facilitate the acceptance of the final strategy and is implementation afterwards, reducing possibilities for conflict.
3) A multi-level governance structure is advisable, extending communication channels between local, regional and national level during the strategy preparation. This applies also for the application of EU Bioeconomy strategy goals and transferring them first through country and then to the region.

During the development of this task, specific context related aspects have had an influence on the CEE regional strategy development. In particular, the impulse taken by the BioEast initiative, which by the beginning of 2020 had started the coordination for national bioeconomy strategies in the macro-region. Within the implementation in each country, specific analysis of the national bioeconomy have been carried out – or in process -, raising awareness between key bioeconomy sectors, the attention of regional governments about bioeconomy as a concept and is expected contribution towards a more sustainable development. This has been of great importance for the regions, and perhaps constitute

a key milestone for the actions carried out at regional level and within the RBH, since previous to the beginning of the project, little or no understanding existed about bioeconomy among regional actors and what it encompasses. That which is not understood cannot be discussed and cannot be acted upon. Thus, integrating key stakeholders at national level has elevated the discourse and facilitates a definition of bioeconomy at regional level.

Furthermore, the effect of the Covid-19 outbreak has been noticed, mainly in the development of participatory actions and the contact among regional and national government, the latter due to need for secure platforms. This has limited group discussions, and decrease the speed of gathering opinions from all interest groups. The regions have resorted to phone calls in some cases and online meetings.

The planning for the new financial period (2021-2027) coincided with the development of this task, with regions defining their Operational Programs and updating their Smart Specialisation Strategy. These two tools for industrial modernisation and investment contribute to set out both ad hoc funding schemes to implement the bioeconomy priorities and support the mechanisms that ensure coordination between ESIF and Horizon Europe. This has been key, given the relevance to pair different financial instruments in order to support the whole value chain and to make a pre-assessment analysis of the needs to be fulfilled before designing the appropriate funding schemes[46]. Particularly in the bioeconomy, that applies by definition at the cross-sector, cross-policy and cross-border level. Furthermore, the Green Deal, which is expected to pave the way for an increased involvement of private investors in such a sector is consider a new opportunity to CEE regional strategy and roadmap implementation. The EU has put a lot of effort into designing financial instruments by using public resources aimed at leveraging private sector investments in climate-relevant projects. A perfect example is represented by the upcoming ECBF – European Circular Bioeconomy Fund[47], a co-investment fund investing in the Circular and Bio-Based Industries in Europe with the EIB as a cornerstone investor, aimed at attracting private investments that bring bio-based innovations closer to the market.

Finally, the experiences in CEE regions highlight the importance of the bioeconomy strategy as a coordinating framework that considering the current picture (initial status) as well as the desired long-term development of the bioeconomy. The coordination to be supported by the strategy is with regards to regional resources: financial resources, infrastructure, logistics, technology, trained workforce, as well as information. Includes also the resources to organize actors, establish communication between sectorial actors and the public sector, for instance the support to clusters and its management. Furthermore, should include also the resources at hand (or to be developed) within the public administration to facilitate the coordination of actions and later on follow-up and monitor their implementation.

46 See D4.3 Recommendations for the use of EAFRD and other funding instruments in early stage finance, par. 4.12 pag. 38

47 See D4.3 Recommendations for the use of EAFRD and other funding instruments in early stage finance, annex B, pag. 76

ANNEXES

Annex I: Template 5.3 – Regional bioeconomy development in WE regions

TEMPLATE 5.3. – bioeconomy strategy development in western regions

Date: 20.12.2019

The questionnaire is composed by two parts. Part I include questions about the elaboration of the regional bioeconomy strategy, its organisational process and management and Part II focuses on the Roadmap establishment. The survey results will provide recommendations and good practices to the POWER4BIO regions, currently in the process of developing their bioeconomy strategy as well as to support WE regions to update their strategies.

The questionnaire should give a clear picture of the specific situation of your region and the organisational and operational structure you have chosen, which has contributed significantly to the successful development and the implementation of the bioeconomic strategy.

These approaches should serve as an orientation/example for POWER4BIO regions currently in the process of developing their bioeconomy strategy.

It can also provide valuable information for regions that have already developed a strategy to effectively plan, implement and review their strategy/roadmaps. All of these insights and contributions will be included in the Guideline "Regional Bioeconomy Hubs in Central and Eastern European regions for Regional Bioeconomy Strategies".

PART I: Elaboration of the regional bioeconomy strategy *In a narrative text, please describe the development of your Regional Bioeconomy Strategy (RBS), including insights of the specific conditions in your region during the process. Aspects in the left column are basic to assess in your text. Please do not hesitate to mention any additional aspects that we might have not included.*		
Region name		
Date (dd/mm/yyyy) (when template is filled out)		
Organisational aspects of the strategy development	**Explanation**	**Description**

Drivers	*Please respond according to your regional situation at that time. E.g. EU or the national policy, market needs, sustainability aspects or need for economic growth etc.? – if there are several drivers, please list them by decreasing importance)*	
Strategy development initiative and its leaders/initiators	*Please, provide an overview regarding the important steps (milestones) from the first idea to the adopted regional bioeconomy strategy. It is clearest if you proceed analogously to the* ***example in Annex I.*** *(Feel free to place the overview at the end of the document)* *Please show also the actors (not individually but by the field of the work) involved in the process of regional bioeconomy development* *The individual steps can be defined by reaching certain milestones.*	
Timeline of the strategy development	*Please indicate the time span (in months) required to reach the respective milestones in the strategy process.* *For example:* *Start - MS 1= 2* *MS1-MS2 =3.5*	

Governance Structure for the strategy development	*Already in place or constituted for the strategy development process. Please take the **example in Annex II** as a guide*	
Regional bioeconomy vision	*If there is any bioeconomy vision in your region, please include the text.*	
RBS scope	*Please, describe the RBS scope. How were the regional bioeconomy sectors of relevance defined?* *Please, describe the RBS scope*	
Financial support during the strategy development process	*If your region receive any financial support during the development process, please explain from whom come the money and for what exactly was supported*	
PRIORITY SETTINGS		
Relevant sectors	*The strategies usually provide the framework for various activities, which are grouped in priority areas and their corresponding goals* 	

	Please, name the bioeconomy priority areas defined in your region.	
Definition of priority areas	*How were the priority areas carved out. Please give a short overview of the approach.*	
Was a definition of bioeconomy established during the strategy development process? Was it taken from the European Bioeconomy strategy or national strategy? What would you recommend in this respect?		

STAKEHOLDERS-PARTICIPATORY APPROACH

Which participatory approach has been used for stakeholders involvement?

Please differentiate between the stakeholders leading the initiative (organisers of the strategy development process) and all other stakeholders included to assure the participatory process.

Be descriptive regarding: experts involved, external support (from outside the region or country), timing of their involvement and approaches used to reach them and their opinions, ei: workshops, survey, online consultations, others)

Please use the following table to list the main groups of stakeholders that were engaged during your bioeconomy strategy development process, with respect to the development phases experienced in your region. Indicate as well their roles.

Phases in strategy development (e.g. initiation, vision creation, data collection, consultation, priority setting, goals definition, etc.)	**Stakeholders groups engaged** (e.g. forest sector stakeholders, chemical industries, investors, conservation organisations, etc.)	**Roles**

How was the strategy draft communicated? Who had the possibility to comment it? Was the feedback structured as an open discussion (platform) or specific groups of people/organizations were selected to give feedback?

How to conciliate/reach agreement between contrasting stakeholder's perspectives and interests? How to deal with these potential conflicts during the priorities setting phase and goal setting phase? How to approach and deal with stakeholders with clearly opposing positions or that could be highly affected by the resultant bioeconomy strategy? Example: oil-based sectors.
Please express your best advice regarding the following issues:
What *organizational* and *communication* issues are most relevant to take into account during the process? What type of challenges might arise and how would you recommend overcoming them?
In the framework of the regional participatory approach: Which activities and/or methods provided the best results to contact and engage the stakeholders? Which approaches resulted ineffective or problematic?

Policy coherence is important from the very beginning, to match regional and national goals, within given EU framework. **Please mention the *best practices/approaches to assure policy coherence* in the process of bioeconomy strategy development with all relevant regional, national and EU documents.** (e.g. goal-by-goal policy crosschecking with the responsible ministries; or any other policy platform). **How would you recommend integrating existing Regional Smart Specialization Strategy with the regional bioeconomy strategy**? **How was sustainability addressed in the regional bioeconomy strategy of your region? Which are the best approaches to assure including social, economic and environmental aspects**?
Were there specific *tools* used in your region during the strategy development process that you could recommend? (Example: Forecasting, backcasting, problem tree analysis, etc.) Please mention as well, aspects to consider for an appropriate use of those tools.
Which *best practices for priority setting* of the regional bioeconomy strategy were used in your region?
PART II - ROADMAP ESTABLISHMENT

The roadmap constitutes the development of the strategic high-level goals into more precise goals and specific measures to assure strategy´s implementation. To this end, indicators that enable to track changes in the implementation and a monitoring plan are also part of the roadmap.
Which approach was used in your region for the development of implementation measures for the bioeconomy strategy?
Which approach was used in your region for the design of new policy, innovation, financial and cooperation instruments, among others?
Being bioeconomy a systemic field, how were complementarities between goals and implementation measures of the roadmap assessed? (trade-off and synergies)
What are the major challenges your region is facing in the implementation of the regional bioeconomy strategy and specific measures?

Please indicate if following factors are affecting the implementation of your regional bioeconomy strategy and in which particular cases do you identify them. **Communication** in terms of consistency, clarity and dissemination *Cited in Marume et al., 2016: "Edwards and Sharkansky (1978:295) stated "The first requirement for effective implementation is that those responsible for carrying out a decision must know what they are supposed to do. Orders to implement a policy must be..... consistent, clear and accurate in specifying the aims of the decision-makers.""* **Resources,** concerning lack of finances, physical resources, infrastructure, equipment, buildings, technology, trained workforce and information. Include as well the public administration perspective, which deal with resources to organise actions, establish new procedures and follow-up or monitor implementation. **Disposition of key/enabling stakeholders.** Willingness of decision makers, reduction of regulatory barriers, impulse from private and public institution for capacity development, etc.
How are described challenges and factors so far being overcome or plan to be overcome?
LESSONS LEARNED – FINAL REMARKS
Please, describe any other lessons learned during the *development* of the bioeconomy strategy of your region.
Please, describe any other lessons learned during the *implementation* of the bioeconomy strategy and specific measures of the roadmap in your region

Annex II: Summary - Workshop on Regional bioeconomy challenges

Workshop Summary – Regional bioeconomy challenges and possible solutions

Place and Date: Munich - 22.01.2020

Table 1. Stakeholders, cooperation, facilitating engagement
Facilitator: Marek Pszonka (Mazovia Energy, PL)

Main Challenges

1. Trust (New area of economy)
2. Communication between actors
3. Structural cooperation between actors
4. Long term thinking
5. Public awareness

Main solutions

1. Good examples (specific)
2. Pilot projects
3. Communication: advertising campaigns (also for children)
4. EC targets for member states
5. More cooperation opportunities
6. Educational programs (Bioeconomy, collection of waste, etc)
7. Volunteers → policy
8. To show stakeholders argumentatively why is it good to engage in bioeconomy activities (e.g. shareholders, profit)
9. Mobilize young people
10. Exhibitions, fairs, media, social media
11. Involvement of incumbent leading institutions (Chambers of commerce)

Red cards – Challenges

- Lack of time apart from daily activities to participate in dialogues on BBE
- Related to trust: Competition about public funding between key actors (between forest industry, agriculture, nutrition, chemistry, biotechnology, bioenergy, etc) → no "central institution" responsible for bioeconomy.
- Probably related to trust: Transparency about "who is doing what" (ministries, research, clusters)

- → no “central institution” who has a comprehensive overview of actions.
- → Different initiative in various fields of industries, research, i.e. Environmental/sustainability actions, new material development, recycling, circular economy.

- Lack of training and skills: competitive processes → scaling up from lab to industry scale. VALLEY OF DEATH
- Very young and unknown port of economy in Poland
- Structure of the bioeconomy sector, communication channels between all bioeconomy actors
- Weak collaboration between all bioeconomy market actors
- Related to mobilization of farmers: low expertise/technology level of primary production but also difficult dialogue between farmers/foresters and industry
- Weak collaborations between research
  - Maybe its more weak technology transfer
  - Industrial research is – of course – kept private (IP)
- Different objectives between actors of primary sector
- Biomass is not quantified, so it cannot be used (The real production is unknown)
- Farmers expanding, but this causes, e.g. Nitrogen emission, polluting nature areas
  - → protest from citizens and eventually government
  - → number of animals needed to be decreased
  - → loss of capital invested
- Biomass energy is sometimes facing opposition, environmental benefits would not be clear
  - → Forestry may hesitate to invest in further biomass production
- Cycle of elections vs long-term investment into bioeconomy → policy makers & politicians as key stakeholders
- Pilot projects awareness, following good examples/ practices
- Farmers are suspicious to alternate use of biomass vs traditional one
- Giving more info to stakeholders about alternative products from biomass
- Trust among actors – cooperation:
  - Mobilization of farmers due to lack of trust in policy institutions
  - Integrate supply chain: openness of actors, learn to work together
  - Close the gap between R&D and industry.

<u>Green cards – solutions</u>

- Catalogue of questions & needs of farmers
- Workshop and training with farmers
- Communication – Education and campaigns → win acceptance and interest of consumers → push factor for industry.

<u>Table 2: Policy framework and biomass supply</u>

Facilitator: Nora Hatvani (Bay Zoltán Nonprofit Ltd. for Applied Research, HU)

Red card- challenges	**Green cards- solutions**
Common understanding of bioeconomy between policy makers, practitioners, R&D organisations	Inviting all sectors → interpretation provided by Hungarian Bioeconomy Cluster

Policy makers discussing with the practice Policy: there is no bioeconomy definition	Education → how to read the directives?
Lack of indicators to measure impact/progress of BBE policies	Adaptation of measures from other sector(s)
Not always clear what exactly is the benefit of bio-based. E.g. Wood pellets for power	
Lack of specific and tailored policies to support bioeconomy Complexity of regulation Excessive regulation Contradicting policies Not clear legally (not allowed) if fast growing plants can be planted (Slovakia) Lack of incentives	- Policy cooperation between ministries - Mainstreaming bioeconomy in other policies - Include bioeconomy in all newly developed policy documents
Restriction of biomass use, since it is catalogued as waste	Pilots to show how far you can go with waste without any harm (policy)
Product requirements differ between EU countries	
Biomass supply: Biomass prices – Export of biomass to WE from CEE	Financial support for companies utilising biomass locally
Biomass supply: profitability only if there is financial support on behalf of the state Biomass supply: is not effectively used. Change of human mind. What waste really mean?	- Project establishing platforms → many people involved - Maintaining these platforms after project ending - Education for all sectors (biomass supply) - Specific subsidies and supports (e.g. lower taxes)
Biomass supply: problems with logistics Transporting distance is rather short in the case of many biomass → question of profitability	Focus more on short supply chains
Biomass supply: definition of biomass potential (corn/exported corn? …) → has to be defined (Hungary) - Hungary – corn: → bioethanol – is this potential? → feed	Biomass produced totally (not defined) ↕

"Decided" – Bioethanol plant does not care about Quantify regional biomass	Biomass unused - Data not available - Main producers have to be involved - Statistical data are insufficient - Estimation methods needed - Seasonal factors can affect the calculations
Not systematic controlling of feedstock	
Lacking sustainability criteria	
	Others: Authority for sustainability - Biomass -> logistics -> conversion -> use > end of life - Bio vs Fossil - Different LCA aspects vs Health vs economy /employment Issue was: Lack of trustworthy info allows parties to claim (dis)advantages based on general properties → qualitative

Conclusions

As for the bioeconomy-related **policies**, the most important challenges are

- Lack of information and common understanding in all stakeholder sectors,
- Inappropriate legislative conditions and
- Lack of indicators and methods that could measure the impact and effectiveness of the policies implemented and show the benefit of transition towards bio-based industry.

Solutions suggested:

Supportive national legislative frameworks including funding opportunities have to promote the development of innovative technologies and approaches. Different ministries have to cooperate and efforts should be made to "mainstreaming" bioeconomy in all new policies and provisions.

Organisations such as the Hungarian Bioeconomy Cluster can support the common understanding of the bioeconomy concept by elaborating and disseminating clear, comprehensible and easily accessible information in the field, in agreement with the ministries.

Measures which have already been proven to be effective in other economic sectors can be adapted to serve as indicators for bioeconomy developments.

As for the **biomass supply**, the most important challenges are the following

- legislative restrictions making the utilisation of biomass impossible or very difficult,
- valuable biomass is often exported instead of utilisation in the country/region where it is produced, due to the higher price paid abroad;
- local utilisation is profitable only if it is financially supported directly or indirectly by the state;
- potentials in biomass are only partially exploited as biomass resources are often considered as wastes;
- Difficulties related to logistics (transport cost questions the profitability).

Solutions suggested:

The valuable biomass resources and their processing have to be kept in the country/region instead of exporting, so the profit resulting from biomass processing and producing high value added products can be realized by local companies.

In order to ensure the competitiveness of the bio-based solutions, financial support to these bioeconomy-related initiatives is required, which is independent from funds and grants (eg. investment support, interest rate subsidies, indirect production incentives (favourable tariffs, mandatory admixture ratios, tax advantages), state aid provided for R&D, training, information and promotional activities etc.).

Short supply chains have to be in the focus in order to decrease transport costs.

Table 3. Business, market and funding instruments
Facilitator: Ignacio Martin (Fundación CIRCE, ES)

Red cards – Challenges

- Funding: Access to funding to all types of company sizes
- How to scale successful business pilots? (to whole sector)
- Financing: Missing agreement among parties in value chain → parties oppose to instruments because they feel it brings them more profit and there is often room for debate. E.g. on exact effect on sustainability
- More trust and cooperation not competition among business - bioeconomy is multidimensional
- Business & Market:
  Profitability vs Sustainability
  ↓ ↓
  Industry public administration
  (Primary production)

  Concept issue of biomass as a raw material and to whom it belongs?

- Lack of public acceptance of the benefit bio-based product could bring to my region/society/country/future generation → no willingness of paying more
- Funding mechanisms very much regional oriented but it is difficult to measure “impacts”. NEED →measurement systems for the region to evaluate impact for application and implemented projects → a system covering all the elements innovation/biodiversity/employment/….

The weighting mechanisms to compare them and guide the region to pick whatever drivers each region is more inclined to.

- To boost and facilitate access to a larger number of resources (bioresources with a potential of bio-based applications)
- Business: rural areas business – job creation (depopulation)
- More effective technology for biomass using less expensive
- Financing: need of financing dedicated to R&D for primary sector (not addressing only strictly "agriculture" issues, but addressing bioeconomy opportunities)

Green cards – Solutions suggested

Business and market

- Incentives for bio-based products production + taxes to fuel based products
- Bioresources exchange policies at regional (1st) level, and later at national level
- Resource balance analysis → create new in view to the real available resources. (State driven companies)
- Bioeconomy multistage strategy. It is too difficult to "convince" people to invest in bioeconomy just because is better to the environment → funding needs to be, but as a 3rd stage, after understanding and analysis, which both are time consuming.
- To choose/get the right flagship initiatives. To promote them and really implement them. (lack of CEE governments´ umbrella financing and political support. To make flagship sustainable in decades, the commitment of the CEE is missing
- Believers of bioeconomy as an economical driver. (change of mentality)
- The bigger number of feedstock sources, the more complex to handle. BUT, the easier to mobilize political support and more harmonize bioeconomy vision and supportive initiatives
- Opportunity – business:
    - Awareness campaign to explain what can be done from biomass → public activities
    - Eco-labelling of bioproducts → industry driven
- More trust and cooperation

Financing and founding

- Private-public partnerships → compensation, subsidies (temporary)
- Real cases/real projects → 1 case to advertise.
- Pilot projects to showcase
- Small/temporary funding schemes → then professionally, monitored by the regions
- Not more business potential (salary analysis). MORE business model potential way of measuring opportunities