



H2020 Work Programme

D1.1 – Report on European and regional analysis of the needs, opportunities and expectations to bio-based education/training model

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This project has received funding from the Bio-based Industries Joint Undertaking (JU) under the European Union's Horizon 2020 research and innovation programme under grant agreement No 101023381. The JU receives support from the European Union's Horizon 2020 research and innovation programme and the Bio-based Industries Consortium.



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1. Introduction

There is a general consensus to say that we are moving from a labour-intensive perspective to a capital / technology-intensive perspective. Because of that most of the companies must evolve in the following years to survive; most of them will disappear and a lot of new companies will appear to answer the main challenges of the climate change, sustainability and circular economy. This will affect also the labour market, since in the following years is that most of the jobs will be automatized. This will have a high impact in the current job positions in the biobased industries, since most of the low-skilled jobs will disappear and a high number of people won't fit in the new labour Market. Furthermore, it will be difficult for the companies to find people with the right competences to fulfil the new industry needs, since there will be a demand for jobs with specific qualifications that respond to the innovation components necessary to improve processes, not only in performance and profitability but also in sustainability and currently there is few people prepared to work in these job positions. There is a mismatch between the labour market competencies and the current needs of the industries.

The overall aim of BIObec project is to create a holistic framework for developing and establishing multi-level Bio-Based Educational Centres (BBECs) that should be flexible enough to answer the present and future needs of the industry and of the surrounding. Among the project's objectives, the project should provide a comprehensive understanding of the needs and define criteria and conditions for BBECs to create dynamic ecosystems. BIObec consider that BBECs are intended as centres providing education and training services for a wide range of users, with a focus on the present and future bioeconomy workforce, aligned at the outset with capabilities and skills demanded by the bio-based industries, deeply rooted in the regional context. Given the complex nature of the Bioeconomy, BBECs can be seen as knowledge hubs bridging between knowledge providers, innovation institutions and users/beneficiaries, as well as policy makers.

With the "Report on European and regional analysis of the needs, opportunities and expectations to bio-based education/training model" we pretend to provide information about the needs and expectations of the main stakeholders that should be involved in BBECs, as well as to identify which should be these stakeholders and how they can be involved in the creation of this centres. The results are the first step of a procedure inspired to a 2-step Delphi method which second step will be implemented through co-creation workshop where the stakeholders will be invited to discuss the results and to provide further information about which should be the next steps. The results we present here are also the basis for the development, among others, of tasks T1.3, T1.4, T2.1, T2.2, T2.3.



Three techniques used to get useful data from stakeholders needed to elaborate this report were:

1. Focus Group: 98 stakeholders participated in 19 focus group interviews implemented in 12 countries, which main objective was to
2. Survey: 213 answers were obtained from stakeholders from 17 different European countries.
3. Desk research template: 26 previous and ongoing projects related to BIObec were analysed.

The results give an overview about which is the current situation of the current vocational, academic and life-long learning programs, and focus on the activities that should be considered during the design and implementation of the BBECs. This report also provides information about the desirables services that should be provided by BBECs, as well as the profile of the stakeholders that should be involved in their operation and the main structure. The results are a good starting point for the next steps of the project, where these will be discussed in co-creation workshop were stakeholders from the different European regions will be invited to participate.

2. Methodology

Since at the beginning of the project we were interested to know stakeholders' point of view regarding the needs, opportunities and expectations regarding BBECs, we decided to implement qualitative methods to give them the opportunity to express themselves without any constrain. We also implemented a survey to get the maximum number of answers and implemented a desk research process to identify previous projects related to the topic.

We used the focus group to get qualitative data. A focus group interview is a form of qualitative research in which a group of people are asked about their thoughts towards a product, service, concept, idea, or project. Questions were asked in an interactive group setting where participants were free to talk with other group members.

The focus interviews were planned to include some of the following stakeholders:

- Representatives of Bioindustry associations, clusters, networks, etc.
- Representatives of Bioindustry industry companies at management levels or HR with knowledge on the profiles needed by the industry.
- Representatives from the Education sector, especially those involved in VET education.
- Experts from research and technology development centres.
- University staff involved in topics related to Bioindustry or Bioeconomy.
- Representatives of Administration

Previously to the focus group, specific guidelines were designed to ensure that all the participants have received the same information before the activity. This information was provided by focus group's moderators and include a general overview of the BIOBEC project and the importance of the objectives that the project pretends to achieve. Furthermore, some instructions to warm-up the participants were given to the moderators.

The structure of the focus group considers the following topics (full focus group guidelines are available in the annex):

- The general socio-economic industrial context and the bio industries in the Labour Market (this was used to warm up the participants)
- Programs for vocational, academic and life-long learning
- Educational Centre Framework design
- Identification of potential certification scheme
- BBEC organizational approach

The development of each focus groups took between 70 and 90 minutes, and they were conducted by two moderators, one of them asking the questions and moderating the interactions between the participants, and the other one taking notes about the main ideas that emerged during the activity. So that, the information used it not literal, but a summary of the main ideas emerged in each focus group.

To maintain participants confidentiality all the data from each focus group was presented grouped, so that in the analysis only the country and the number of the focus group is identifies. Below a summary of the focus groups implemented and the code used in the results analysis.

Table 1: Focus groups codification.

Country	Partner responsible	Code
Austria	Universitaet fuer Bodenkultur Wien	AT1
Bulgaria	Trakiyski Universitet	BG1
Czech Republic	Zemědělský výzkum, spol. s r. o.	CZ1
Denmark	Food & Bio Cluster Denmark	DK1
Finland	Itä-Suomen yliopisto	FI1
France	Institut des sciences et industries du vivant et de l'environnement - AgroParisTech	FR1
France	Institut des sciences et industries du vivant et de l'environnement - AgroParisTech	FR2
France	Institut des sciences et industries du vivant et de l'environnement - AgroParisTech	FR3
Germany	Universitaet Hohenheim	DE1
Italy	FVA sas di Louis Ferrini & C	IT1
Italy	FVA sas di Louis Ferrini & C	IT2
Italy	FVA sas di Louis Ferrini & C	IT3
Italy	FVA sas di Louis Ferrini & C	IT4
Italy	Alma Mater Studiorum - Università di Bologna	IT5
Ireland	Munster Technological University	IE1
Poland	Instytut Badań Edukacyjnych	PL1
Poland	Fundacja Edukacji i Dialogu Społecznego Pro Civis	PL2
Spain	Universidad Autònoma de Barcelona	SP1

Spain	Fundación Corporación Tecnológica de Andalucía	SP2
The Netherlands	Stichting IHE Delft Institute for water education	NL1

We used the survey to get quantitative data from the stakeholders that should be involved in the development of the BBEC. The aim of this survey was to know which were the needs, opportunities, and expectations that stakeholders have regarding what BBEC should be.

To do so, a self-administrated survey that contain 24 questions grouped in three blocs was deigned:

- Socio demographic information of the participants (5 questions)
 1. Age
 2. Gender
 3. Highest level of studies
 4. Professional profile
 5. Country of residence
- Information about current situation of bioeconomy in respondents' country (6 questions):
 6. need to raise awareness about the bioeconomy and circular economy
 7. need to identify which are going to be the main professional roles in the field of bioeconomy and circular economy
 8. presence of enough entities providing training activities in the field of bioeconomy and circular economy
 9. need to improve bioeconomy and circular economy education giving the students more opportunities to learn about the bio-based industry sector
 10. need to improve the methodologies used to teach bioeconomy and circular economy to promote the acquisition and domain of soft skills (communication skills, teamwork, entrepreneurship, innovation mindset, etc.)
 11. need to certify the competences acquired through the experience in the workplace, for professionals working in bio industries
- Information about the desirable situation regarding BBEC (13 questions):
 12. BBEC should provide educational and vocational counselling services
 13. BBEC should facilitate the exchange of good practices between different regions
 14. BBEC should strengthen the collaboration of companies and educational institutions through the design and execution of joint training projects
 15. BBEC should facilitate the participation of the industry in the educational process (e.g., guest lectures, thesis, scholarships, internships, etc.)



16. BBEC should promote collaboration of companies and educational institutions to implement bioeconomy and circular economy joint innovation projects
17. BBEC should establish bridges between different levels of education and collaboration among training providers
18. BBEC should provide resources and training materials to educational institutions
19. BBEC should monitor the dynamics of the bioeconomy and circular economy to identify the current and future competences needed in the sector
20. BBEC should certify providers of bioeconomy and circular economy training to ensure they are aligned with real industry needs
21. BBEC should provide train-the-trainer activities to update the pedagogical competences of teachers, professors and trainers in the bioeconomy and circular economy
22. BBEC should provide opportunities to teachers, professors and trainers to update their knowledge and competence regarding bioeconomy and circular economy
23. BBEC should have laboratories and other equipment to support R&D&I and the innovation-related activities of companies
24. BBEC should help companies in opening their doors to international cooperation

More than 2.500 stakeholders were invited to answer the survey through the mailing lists of the partners involved in the project. In total, 213 stakeholders answered the survey.

To analyse previous projects that have already implemented research regarding the objectives of BIObec, we implemented a Desk Research to get information about different documents, related to previous projects, national reports, international reports, bibliography, etc... The structure of the template used in the Desk Research was:

Identification of the project Title / Website / Main Objective
Link to documents, if its available online If not, upload on TEAMS / WP1 / T1.2-Desk_Research. Specify the name of the file below
Brief summary of the project <i>(Objectives, context, methodology, main results) – The most important are the main results</i>
Identify which are the <u>main conclusions of the project</u> that related to BBECs needs, opportunities and expectations.



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3. Sample

In this section we present the characteristics of the participants of the Focus Groups and the ones that participated in the survey.

3.1. Focus groups' sample

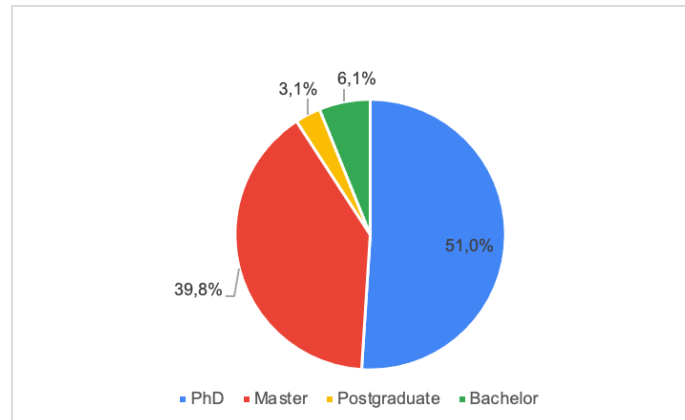
In this stage of the study 98 stakeholders participated in 19 focus group interviews were implemented in 12 different countries as it is summarized in the following table. Note that There were 6 extra participants in the focus groups of Italy that denied facilitating the researchers their sociodemographic data. So that, they are not included in the sample description

Table 2: Sample of focus group participants by country

Country	Number of participants	Percentage
Austria	7	7,1 %
Bulgaria	1	1,0 %
Czech Republic	5	5,1 %
Denmark	6	6,1 %
Finland	4	4,1 %
France	14	14,3 %
Germany	5	5,1 %
Italy	20	20,4 %
Ireland	8	8,2 %
Poland	14	14,3 %
Spain	9	9,2 %
The Netherlands	5	5,1 %

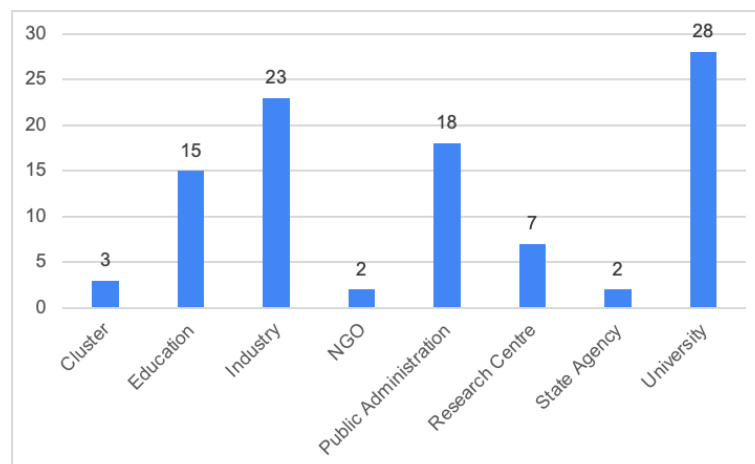
Regarding the sociodemographic profile of the participants, 49 were male (50%), 48 women (49%) and 1 nonbinary (1%). Considering the age of the participants, they were mostly in the age bracket of 40 to 50 years old (35,7%), 50 to 60 years old (25,5%), 30 to 40 years old (23,5%), over 60 years old (9,2%) and between 20 to 30 years old (6,1%). The maximum educational studies of the participants were in 51% of the cases PhD and 39,8% Master, as it's shown in the following figure.

Figure 1: Focus Groups participants' educational level.



Considering the profile of the participants sending organization, most of them had experience from the University (28, 28,6%), and the industry (23, 23,5%) and others had experience from Public Administration (18, 18,4%) and Education (15, 15,3%). Others had experience in State Agencies, Research centres and Clusters. Considering the organizations size considering the number of the employees, participants came in the 32,7% of the cases from companies over 1000 employees, 16,3% between 101-500 employees, 16,3% less than 10 employees, 16,3% between 11-49 employees, 14,3% between 50 to 100 employees and 4% between 501 and 1000 employees.

Figure 2: Focus Groups participants' Organization type.



Regarding the number of years of experience in their current or similar position of the participants, there was 22,4% of participants with less than 5 years of experience, 20,4% between 6 and 10 years of experience, 20,4% between 11 and 20 years of

experience, 23,5% between 21 and 30 years and 13,3% over 30 years of experience. The professional profile of the participants is summarized in the following table.

Table 3: Focus groups participants' professional profile.

Professional profile	Number of participants	Percentage
Academic	19	19,4%
Bioeconomy	9	9,2%
Consultant / Expert	6	6,1%
Innovation	6	6,1%
Manager	33	33,7%
Others	7	7,1%
Project Manager	6	6,1%
Researcher	12	12,2%

The list of participants' organization is available in the annex.

3.2. Survey's Sample

In total, 213 answers were obtained through the survey. The answers came from 17 different European countries, as it is summarized in the following table.

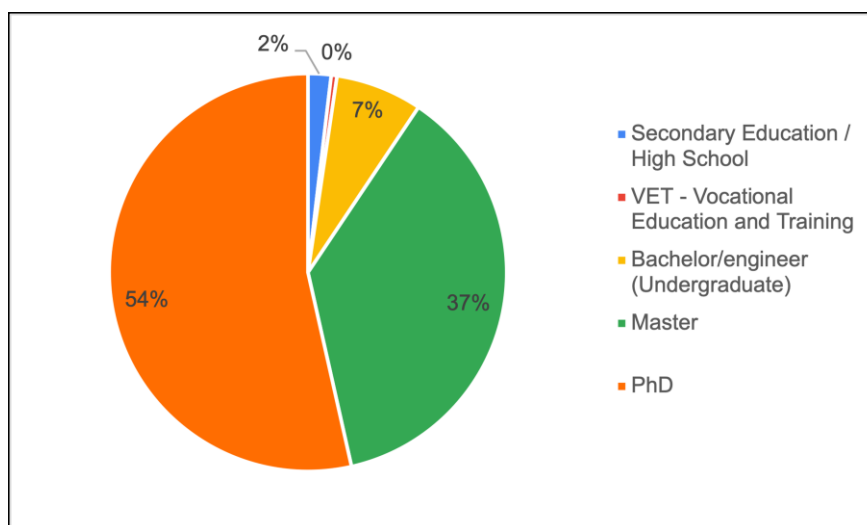
Table 4: Sample of survey participants by country

Country	Number of participants	Percentage
Austria	30	14,1%
Bulgaria	6	2,8%
Czech Republic	3	1,4%
Denmark	4	1,9%
Estonia	1	0,5%
Finland	10	4,7%
France	15	7,0%
Germany	13	6,1%
Greece	2	0,9%
Ireland	11	5,2%
Italy	30	14,1%
Netherlands	1	0,5%

Norway	2	0,9%
Poland	22	10,3%
Slovakia	1	0,5%
Spain	59	27,7%
Sweden	3	1,4%

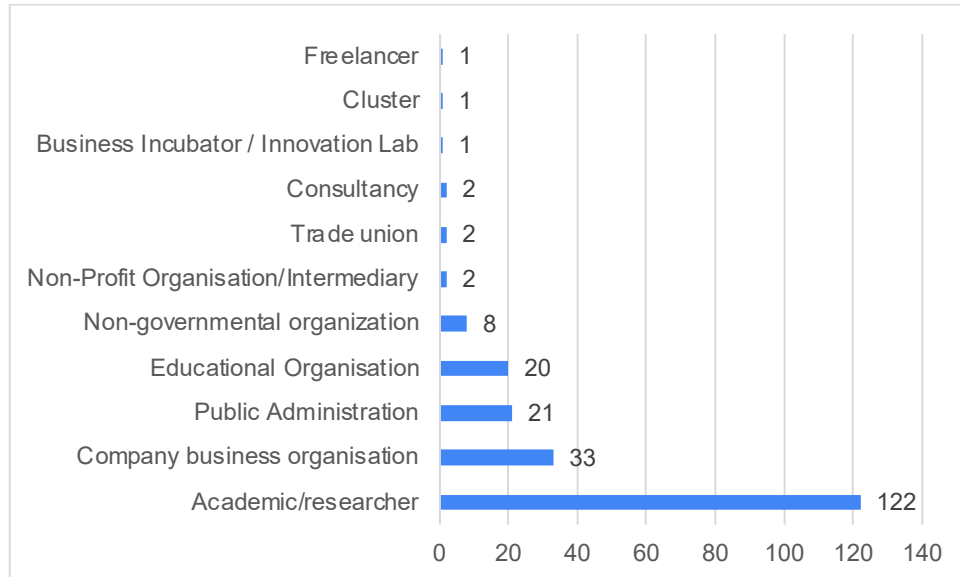
Regarding the sociodemographic profile of the participants, 117 were male (54,9%), 93 women (44,6%) and 1 nonbinary (0,5%). Considering the age of the participants, they were mostly in the age bracket of 51 to 60 (31,5%), 41 to 50 (23,5%), 31 to 40 (20,7%, over 60 (13,1%) and from 11 to 30 (11,3%). The maximum educational studies of the participants, as shown in the following figure, was in 54% of the cases PhD and 37% Master, 7% Undergraduate, 2% secondary education / high school and only one person from VET.

Figure 3: Survey participants' educational level.



Considering the professional profile of the participants, most of them are from the academia (122, 57,3%), followed by company and business organizations (33, 15,5%), Public Administrations (21, 9,9%), educational organizations (20, 9,4%), non-governmental organization (8, 3,8%), non-profit organizations (2, 0,9%), independent consultants (2, 0,9%), and trade unions (2, 0,9%). Furthermore, there were 3 participants (1,4%) that come from other kind of organizations such as innovation labs, clusters and freelance.

Figure 4: Participants' Organization type



4. Results

In this section we present the results obtained in the focus groups and the survey.

4.1. Focus Groups' results

In this section the results of the focus groups are presented organized through the 6 main topics that were discussed on them. These are:

1. Programs for vocational, academic, and life-long learning
2. Educational Centre Framework design
3. Identification of potential certification scheme
4. BBEC organizational approach

4.1.1. Programs for vocational, academic, and life-long learning

In this section we asked the focus groups' participants to discuss and reflect around the following questions:

- Do bioindustry workers currently have appropriate skills and training?
 - What is working well and what can be improved?
 - What training should workers in the bio industries have?
 - What would be essential, important, and desirable?
- Where should this training be acquired (school settings or workplace settings)?
- How can we improve the current structure of educational programs in the biobased industries? Is it necessary to change the initial training? At which level?

During the focus groups, participants highlight that it's difficult to find professionals in the job market with the appropriate skills to fit in their job positions. This is the reason why **most of the companies are implementing in-house training to give their professionals specific skills and knowledge** adapted to the characteristics of the company industrial processes. However, it's considered that something has to be done to help small companies that cannot effort to pay for tailored training and, for that reason, are unable to change their processes.

There are some virtuous cases in Italy with medium-large companies representing the driving force for sustainable conversion: they have self-created specific training courses on bioeconomy sectors as is the case of biorefineries. (IT4).

In the case of Spain, it's mentioned that for some of the companies it's difficult to implement in-house training because they are SME, and they have problems to identify and hire specialists to implement the training.

for SMEs sending a worker to a long period training would mean losing that worker for a period a time and the need to find a replacement and pay for it. This is not possible because of the limited resources available (SP2)

For large companies it's quite usual to contact universities, or experts, to hire their services to design and implement tailored training, but this is not possible for SME. (...) At lower training levels, such as VET, it's too difficult for all kind of companies to find tailored training offered by official schools (SP1)

Some of the participants in the focus group consider that **access to formal courses could be also a problem for some active professionals** that want to update their knowledge and competences. In this situation they consider that **new accreditation systems based on micro credentials on the bioeconomy may help engaging workers** who may not be able to attend more intensive courses or designed to respond to specific upskilling needs (IT4).

Some of the participants in focus group considered that *it's important to integrate bioeconomy in the curricula from an inter-disciplinary and cross curricular point of view (AT1)*. According to that, they highlight that **there is a lack of solid basic knowledge that it's needed to achieve sustainability, reduce costs and benefit from circular economy.**

(...) bioeconomy should be included in non-bio fields of study, such as lawyers, IT, financial staff, economists (...) and administration officials and policy makers (PL2).

(...) mid-level workers with a solid basic education and training need also solid basic knowledge about sustainability, handling of waste (some workers don't know that doing it wrong costs money to the company), accounting and finance. (SP2)

We must think that, at the end of their studies, the students are not able to draw up an LCA and this underlines serious gaps. I don't believe in a possible graduate in "Bioeconomy", but in interdisciplinary education. (IT5)

To fully embed the bioeconomy across disciplines there should be bioeconomy modules integrated into existing programmes and to demonstrate the links with other study disciplines and ameliorate the lack of understanding of what bioeconomy means. (IE1)

Universities should inspire them and show that they can contribute to protect the climate and come up with new technology and solution. (CZ1)

In the same way, other focus group participants consider that **higher education should be based on “contamination of knowledge”**. That means that it's important to create strong connections among different training specializations. To consider that education must provide specific professional figures (e.g., Chemical engineers) that are, however, "contaminated" by knowledge from other sectors of the Bioeconomy (“What is bioeconomy?”, Bioethics, Calculating an LCA, etc.) (...) but this contamination should be done after good preparation on basic knowledge (IT5).

It is suggested to **increase knowledge about the bioeconomy with additional courses**, elective courses, or even specific modules deployable by other universities in already existing programs, rather than delivering completely new curricula (IT4).

From an academic perspective, the preference is not for bioeconomy generalists, but specialists that can apply skills in diverse area using their knowledge from one field to solve bioeconomy problems. Need fundamental understanding. (IT1)

In a similar way, there are some participants that considered that it's important to train professionals that are *capable and can support the conversation and connection between different disciplines and is able to think and take decisions taking into account complexity* (DE1).

According to the answers, **it's important to create a training ecosystem where citizens can find different options of training**; on the one hand, it's important that the training offers of official institutions such as universities, VET schools and high schools update their curricula to provide content and competences related to the needs of the companies. On the other hand, it's important that companies, and professionals, can find institutions with a training offer focused on specific topics linked to the market changes.

In some cases, it's also mentioned that competences and contents related to Bioeconomy and Circular Economy should be included in all formal levels of education.

Bio education should be present at every stage of education and should be supported with non-formal education. It is important that teachers engage in these topics, strive to attract students to them. Education that already exists and grassroots, basic education should be strengthened. (PL2)

(...) the necessity to implement teaching programs starting from primary school level to grow a generation sensitive and interested on circular lifestyles. (IT4)

It's considered that **there is the need to offer activities to awareness citizens about the importance of bioeconomy and circular economy**, so that, some of the participants consider that it's important to *expand this topic more widely so that it is also possible to **expand the possibilities of building awareness and knowledge among primary and secondary school students** about the economic use of biomass without prejudice to ecology or the environment (PL2)*. In that way, some of them, *stressed more the necessity to start thinking at sustainability as **basic transversal training to be introduced at all educational levels** and at all ages, regardless of the biobased sector. Sustainability should become a mindset (IT1)*.

Introducing early education outreach for primary and secondary schools is a highly beneficial place to focus on. (IE1)

Education and know-how for the "green transformation" have to be improved and adapted accordingly in the future (especially within the secondary schools) emphasizing also the intercorrelations. But also, already in the primary school aspects of bioeconomy should be educated. (AT1)

In the case of Spain, the participants highlight that when companies are talking about more qualification, they are not always referring to higher levels of qualification such as Master or PhD programs but to the need to update and focus the qualifications that graduates are obtaining at VET or Bachelor level. This is similar to what is said in Germany, where some participants highlight that *there will be a need of professionals that can create a sustainable transition, people who can manage this transformation practically and not just theoretically (DE1)*.

The participants in the focus group consider that **there is a need to approach companies and educational institutions to collaborate in the definition and implementation of training programs**. Educational institutions, or the educational system itself, should provide structures to facilitate companies inform their current and future needs, especially SME, since large companies usually find the ways to contact administrations or provide tailored training to their workers. However, it's highlighted that those collaborations *between industries and administrations / universities are usually short and respond only to specific needs; there is a lack of continuous collaboration (SP1)*.

Furthermore, it's mentioned that the **university timings to update curricula is a big problem because it's quite slow**. As example, participants on IT5 considered that *3 years to approve a bachelor's or a master's degree from the idea to its execution is a barrier that makes academia an actor too slow for the external world, which changes rapidly*. There are more cases where it's mentioned that **the processes followed by universities to change their educational programs is too slow**, since it can take

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up to 10 years to change the curricula and get professionals trained with the new one. For this reason, it is highlighted that *it is important that business communicates its needs, anticipates the demand for competences, which could be translated into the language of learning outcomes* (PL1). Furthermore, in Italy it is said that *Universities are still offering solutions connected to the old business model and detached from the fast-changing reality. University response will arrive in 15-20 years, but companies need answers today* (IT2).

In the case of Spain there are some experiences in **Dual VET programs where the collaboration between VET Schools and the industries is closer and more active**. In Dual training students *can learn competences related to the workplace, which is a benefit for them and for the industries that will hire them in the future, since they are more prepared to access the job market than those participating in regular programs* (SP1). Furthermore, in Spain the participants highlight the **opportunities that new regulations give to VET institutions**; now they can provide specialized courses, where the collaboration with companies is easier than years before.

In the case of Poland, it's also mentioned that some important changes are made, since *“Ministry of Education and Science has already published the basic directions of the implementation of the state's educational policy in the school year 2021/2022, and included, among others, the Implementation of the Integrated Skills Strategy - development of professional skills in formal and non-formal education, including adult learning* (PL2)

In the case of universities, in **Spain there is a lack of trust between universities and companies**. In the last years *more and more universities are including advisory boards linked to the faculties and schools to get the opinions and feedback of professionals and companies regarding their graduates; the improvement of the relations has been also good to improve the collaboration of companies offering positions where students can do stages during their studies* (SP1). In the case of Poland there also experiences of collaboration through advisory boards or stakeholders' councils; however, it's also mentioned that in the case of **Poland the business and education have conflicting interests**. *Universities are autonomous and want to extend the cycles of education, preferably to 5 years, because it provides them with a long-term financing perspective* (PL1). However, in Italy it's considered that thanks to research programs such as *Horizon 2020 projects (that require multistakeholder partnership) and the funds dedicated to the industrial PHDs programs recently launched in Italy, the collaboration Industry-Academia will be significantly reinforced* (IT3).

In some of the focus groups it's also highlighted the **importance to foster higher levels of collaboration between VET institutions, Universities and Companies** when training programs are designed identify logical training path between the different training levels. Some participants suggested the possibility to **strengthen systemic thinking and the ability of interconnecting multidisciplinary contents to transform challenges in opportunities**. (IT3).

In the case of Finland, it's considered that *collaboration is important at all levels, but more work could be done specifically within universities (FI1)*, while in the case of Czech Republic *the current education infrastructure shall be used more properly, there is no need to establish another education institution, but cooperate, share good practice, do networking activities (CZ1)*.

The importance of **Soft Skills acquisition** within the current educational programs is highlighted in several focus groups. There is a need to increase the presence of this competences in the curricula to foster a workforce trained in:

- Analysis of complexity;
- communication and interdisciplinary communication;
- cooperation;
- creativity;
- decision making;
- entrepreneurship;
- flexibility to deal with uncertainties;
- innovation thinking;
- management;
- problem-solving;
- teamwork.

In the case of Poland, some of the participants in the focus group consider that some of the competences related to soft skills are learned in pre-school, but then are forgotten in the next steps of education:

At the moment, pre-schoolers are the best educated group (...) problems begin with secondary and higher education. And at all levels, people should have the chance to develop the skills they need for the bioeconomy. For example, such skills as observation, creativity, the ability to conduct experiments - these are what pre-schoolers have, and then in the process of education they lose these skills. Openness to experience, experiment, observation - these are the skills that are important and desired in the bioeconomy sector. (PL1)

From the Netherlands it's also mentioned that *the training (of soft skills) should be at school to create a real change in people's mind (...) training at school should be practical, and involves activities connected to real life (visits on site...)*. It could be in the form of a *blended approach, including time at school and time in companies (NL1)*. In the case of Germany, it's said that *it's imperative to train the doctoral candidates in soft skills (DE1)*.

4.1.2. Educational Centre Framework design

In this section we asked the focus groups' participants to discuss and reflect around the following questions:

- Which are the organizations providing training activities (formal and non-formal) in your specific context? Are they enough? Can you identify any innovative education centre in Bioeconomy?
- In which way can BBECs help to change the current structure of educational programs? Which might be the difficulties?
- How are companies in biobased sector providing training to their staff? Is it the best way? What might be different?
- Are there enough training providers in bio-based sector? Why?
- If you think there are not enough providers, what areas should be covered? At which educational level (secondary education, vocational training, bachelor, master, PhD...)?

From the point of view of focus group participants, **the current situation regarding bioeconomy education through Europe is that Universities are the main actors providing formal activities, followed by some VET schools that are working with a more technical approach.** There is a need to increase the number of training providers in these areas, as well as to identify new ways of collaboration between the current educational stakeholders, the new ones, and the companies that are requesting professionals with specific competences linked to the characteristics of each region's bioeconomy ecosystem.

The BBECs should not give the basic competences (disciplinary expertise) but should work on the connection skills (interdisciplinarity) (DE1)

The need to detach from an academic-oriented type of training to embrace a good balance between professional and academic education, in order to create specialized but flexible profiles, (...) which can meet the complexity of this new labour market. (IT3)

Many research centres and local universities have specific departments dedicated to the bioeconomy, but it is difficult to create a homogenous framework (IT1).

It is important to establish close cooperation with the Councils of Universities to develop educational courses typical of the bioeconomy (PL2).

However, Finland's participants in the focus group consider that they have enough centres for educating people in various sectors from bioeconomy, providing the example of University of Eastern Finland and the Karelia University of Applied Sciences, which are considered to be well prepared to provide education in innovation

Resources already existing in the regions

In each focus group participants provided some ideas about the main current bioeconomy training providers in their regions. As expected, **almost each area has some organizations that offer training, but they are mostly focused in one specific area of knowledge** in the framework of the Bioeconomy.

Some of the resources mentioned are:

In the Grand Est region (France), there are several sources for mapping the training offer, particularly in the forestry and wood sector, where they grouped together 52 training sites. (FR1)

BIOEAST HUB CZ is promoting bioeconomy, organizing stakeholders, and running several projects focused on technology transfer and education (...) interactive web pages, audio-video materials and also syllabus for the secondary schools (CZ1)

In other cases, the centres are mostly focused on specific profiles of trainees, and they don't provide training options for other profiles of citizens.

Focus group participants consider that there are a wide range of individual institutions developing bioeconomy education however **a model that interlinks across regions avoiding repetition would be useful**. This interlinking would provide opportunities for a greater integration of education with internships, innovation sprints, deep dive sessions and site visits, activities in pilot-scale biorefining, carbon neutral/positive farms/forests, and a multitude of spin-out/spin-in activities

BBEC's role in training

During the focus groups **the participants highlight the importance to develop a framework design adapted to the pace of renovation of bioeconomy knowledge** and the whole training sphere related to it.

BBECs emerge as those to create bridges with national academic institutions (as listed above) but also foreign ones, facilitate the creation of training curriculum and R&D pipeline in bio-based industries (open innovation model). (BG1)

BBEC's should play an important role in **training the trainers and teachers** according to the new competences demanded by the industry, *especially in primary and secondary education* (AT1). This should be a way to approximate the new competences to the existing educational centres, and especially those already providing initial training.

BBECs as provider of higher quality training courses also for trainers: many existing curricula integrated sustainability modules but do not speak explicitly about bioeconomy and "biobased" is not used as a keyword. So, it is necessary to train trainers to improve their knowledge and communication skills: multipliers (namely teachers and trainers) must be solid and credible in teaching these topics. (IT4)

It is also considered that the collaboration between industries and educational centres might be useful to **facilitate teachers learn from the industries activities** through stages, and then transfer this knowledge to the classroom.

That would help eliminate a layer in the knowledge transfer process, where the professor learns from the practitioners and then transmits that knowledge to the students. (SP2)

Furthermore, it appears that the BBECs could be a good place to *improve the pedagogy and upgrade teachers' competences to teach bioeconomy according to the new research achievements* (AT1). In some countries like Czech Republic, it's highlighted that *there is a strong need for experienced trainers, the empirical trainings seem to be more appropriate. The BBEC project can help with experienced trainers in bio industry* (CZ1).

In the same way, in Spain the participants in the focus group consider that it's important to **strengthen the role of affiliated professors**, *who come from industry are usually those who get the best ratings from the students because they transmit applied, real-world knowledge that is valued by them* (SP2). To do so, it should be important to identify which professionals might be interested to collaborate with educational institutions, as well as to identify which professionals have the needed pedagogical skills. If it's required, BBEC's should provide train the trainers courses to teach experienced professionals pedagogical competences that are necessary to ensure a properly transfer of knowledge to the students.

BBEC's should **provide resources to the current educational centres** to help them improve the activities they are performing regarding bioeconomy, such as tools, didactical resources, contents, expertise, etc... It is also mentioned that BBEC's might be useful to identify experts in the field of bioeconomy that might participate in school programs to *integrate the needs of the labour market into the education quicker*. (AT1).

It's also highlighted by participants that there is a lack of **short educational courses** that might help to current professional's career development. For this reason, it's

considered that the BBEC's should provide a **training scheme based in modular courses** that might be accessible for professionals already employed.

(...) are often unaware that there are training options available to help companies to upskill themselves rather than using third party consultants. There is the need for targeted shorter courses. (IE1)

From the system point of view, these training scheme should also provide the opportunity to **facilitate bridges** between the different types and levels of training. According to that, it's important that BBEC's play an active role to establish bridges between schools, VET schools and universities.

It is important that professional training must be flexible for being effective. In this sense, the workers are "sufficiently" trained thanks to in-company training, but we don't have to forget that on average one worker is retrained every 5 years: Continuous learning is fundamental, and it is important to supply it correctly. (IT5)

Considering the specific case of Bulgaria, it is mentioned that BBECs should also *encourage private training providers, that should provide services to all ages and levels of educational background, from early-stage schooling to life-long learning of retired staff, for instance (BG1)*. They consider that because the current educational system is quite closed and inflexible to answer the need of the bioindustry.

In Finland they consider that *it is not necessary to create new Bio-Based Education Centres in this region which are doing an excellent work together and also there is a good cooperation between these two centres (FI1)*.

BBEC's trainees' profile

Some of the participants pointed out that the target group of BBEC's **training activities should include a broad number of profiles**. Some of the profiles mentioned are:

- *Representatives of local authorities*: those who oversee the development of policies in a local level should know what's coming on in the bioeconomy in order to take evidence informed decisions.
- *Companies' owners*: those who are owning small business related to the bioeconomy and cannot access directly other types of facilities to be aware of new bioeconomy updates.
- *Professionals already employed*: those people with previous training background that should update their competences according to new bioeconomy advances.

It is also highlighted that the BBEC should work to **promote interdisciplinary training activities**, where different profiles of professionals could participate, as well as different profiles of trainers. This is important because *bioeconomy is growing up quickly and it is getting connected to almost all fields of the economy, so all kind of*

professionals should have a minimum knowledge about what bioeconomy means (SP1).

Bioeconomy Observatory

In the focus group IT1 participants proposed the creation of Bioeconomy Observatory as part of the BBEC's, which main function should be to **promote dialogue within universities currently offering parallel and similar programs on the bioeconomy** and providing general guidelines at the local level. This could help avoiding fragmentation and to have a more systemic and general vision that makes clear common objectives for university, school, and industry.

BBECs can be then a point of reference to understand what the current needs are and then to decline them through ad hoc training courses. (IT3)

BBEC should be the central unit of coordination and support in giving optimal directions of education, based on constant observation of the dynamics of bioeconomy development in Poland and in the world. (PL2)

The observatory should also identify and monitor which are the industry needs, and *the findings of this analysis need to be communicated to the different actors so they can collectively develop solutions for the issues identified (SP2).*

Finally, it is underlined the necessity to have a *catalogue that brings together education providers in the bioeconomy field in order to better orient students, but also to evaluate and map the employability of these training courses (IT4).*

The participants are aware of the many organisations currently providing educational programmes, but it is unclear precisely how companies are training and/or upskilling their workforce at present, *this provides an opportunity for the BBEC framework design to develop this space through collaboration with all institutes, vocational educational providers and industry representatives and policy makers (IE1).* **The challenge is to bring educational providers, industry representatives and policy makers together to identify and benchmark the existing offerings, highlight deficits, and create a cohesive data driven roadmap for bioeconomy education across the spectrum.**

Some examples of educational programs and institutions already providing training in the framework of Bioeconomy and Circular Economy are mentioned in the case of Italy:

The postgraduate course “Bioeconomy in the Circular Economy” (BIOCIRCE) as a model in Italy for bioeconomy education, involving many universities, institutions, and companies. (IT5)

The Summer School on Circular Bioeconomy & Sustainable Development in Greece as an interesting provider of bioeconomy education in the Mediterranean region. (IT5)

4.1.3. Identification of potential certification scheme

In this section we asked the focus groups’ participants to discuss and reflect around the following questions:

- What are the rules for the certification of training in your specific context?
- Are there any specific systems to certify continuous training or workplace learning? If so, which type of competences / skills are certifying? Is it enough? If not, do you think they are necessary? Why?
- Which kind of collaboration between industries, Public Administrations, Universities, Educational institutions, etc. is needed to improve the competences’ certification of workers and future workers in the bio industry?
- Do you think it’s necessary to change the current system of competences certification? Why? If yes, who should be involved in the process of competences certification? Why?

A homogenous system is required to **consolidate and map existing certifications and create a baseline benchmark for national provision that provide parity and clarity for those considering a career in the bioeconomy** (IE1). Employers may indeed view specialist micro credentials and professional qualifications as more valuable than a degree. **Micro credentials have been pointed out as important** to also involve workers in training programs, but at the same times *there is still lack of knowledge about this tool: a homogeneous system to consolidate who certify these credentials, the tools needed for the certification and what is certified is necessary* (IT4).

It’s important to stablish micro-credentials through short and focused courses that might allow people acquire new competences when they are looking for a new job position, as well as allow companies update their staff when their pretend to innovate. (SP1)

Some participants consider that for **certification and authentication of learning to be recognised by industry and perceived as valuable by potential learners, the awards structure must reflect the inputs both from the company (course fees) and the students (time, effort)**. Also, the benefits of awarding undergraduate and

post graduate qualifications with joint accreditation/association membership may be more appealing to potential students (and their parents/caregivers) as career options can be unclear due to the current positioning and promotion of bioeconomy related programmes.

The main question that emerges during the focus groups is who should certificate these micro-credentials. In general, the **certification scheme of training is mainly focused on formal training organizations** such as universities and technical and VET schools. Some participants consider that **non-formal education should provide some kind of degree, so it can be used for professional career.**

Most of the focus groups highlighted that is important to **identify new ways to certify professionals' competences** as well as other training actions implemented by private providers or in-company by industries. Some participants in Italy agreed on the idea that **certifications should not be provided only by academic actors**, since *the national legislation is not updated to let these education providers certificate these new skills and competences (IT1)*, while others consider *the urgency to understand how to interact with national laws in order to produce training courses that can be certified according to already formalized standards (IT3).*

Establishment of agreements with educational institutions might be needed to establish standardized evaluation systems for the certification of the competencies developed during the training undergone in companies. (SP2)

The certification and **validation process have to be conducted by a multistakeholder working group**, which, in opinion of IT4's participants, it could be part of BBEC's organization to produce a certification of competences and skills also at more competitive costs and to motivate SMEs toward the bio transition.

It would be useful to engage persons from the industry, public administration, universities and other educational institutions for co-creation and exchange during the development of a certification scheme (DE1).

Moreover, it was underlined the necessity to **have experts very rooted in the territory**, because *each region has its own specificity, especially in the bioeconomy sector (IT4)*. The presence of experts could be also useful to *issue recommendations as to directional legal and educational solutions or expectations of directions of support for the development of bioeconomy (PL2).*

It was also noted that *certification should not however become a barrier to entry to the workplace especially where workplace training can be provided. (IE1)*, and some consider that *the main challenge is also to evaluate what are the tools that the professional associations (which in certain professions represent a pivotal point) currently must incorporate micro credentials (IT4)*

In the case of France, the participants in the focus groups consider that there are several systems to certify the participation of people in short or long courses.

The various training certification systems seem to be sufficiently developed in France today, and no specific needs for the bioeconomy have been identified. (FR1)

While in Finland, *training is certified by the rules set by the government, which are at country level (...) and there is nothing that can be changed (...) since adding other certification schemes might increase the bureaucracy and this should be avoided (FI1)*, in other countries it's considered the necessity to update the regulations regarding the certification of skills and competences to be more open and involve other training providers that are currently miss considered.

In Bulgaria they consider that since *the training of the bioindustry is currently limited to academic institutions, the certification of training is known to go through the National Evaluation and Accreditation Agency (BG1)*. They consider that this scheme of certification is not working because people tend to receive this kind of training and they are not interested to participate in other courses where they cannot obtain official certifications. In other places like Czech Republic, the certification depends on the Ministry of Education, but *there is not a system for competence certification yet (CZ1)*, and in the case of Italy participants in focus group consider that the *current regulatory codes for the certification of professional skills are not suitable to recognize and certificate what is required by biobased sector (IT1)*.

Some of the main problems is **how to articulate a system to recognize people previous experience**, that knowledge that they have acquired in their workplace. Since educational institutions, industries and Public Administrations are supposed to be working together in BBECs, some of the activities of capacitation should be directed not only to certify *ad hoc* courses, but previous knowledge and how to link this knowledge with the courses to facilitate people to get a certification.

The current certification schemes should be changed. A room for independent bodies such as BBECs and private training providers should be given. Industry-level certification should also be made possible and each bioindustry cluster could create their own schemes for recognition of skills and their improvement. (BG1)

The certifications provided by BBEC's centres should be aligned with current formal training programs and *involve all educational levels (PL1)*, since BBEC's might work to **stablish bridges between different levels of training**.

A BBEC should make it possible to establish bridges between training courses. (FR3)

BBECs could play a role of network and coordination between different actors. (IT3)

In the case of Denmark, they highlight the importance of the connections between the different educational levels, since through that *individually adapted vocational education, where different educations can be combined, is now possible*, (DK1), and participants in Poland add that this certification should *enable the acquisition of qualifications at the 5th level of the European Qualifications Framework* (PL1).

It's important to think in one type of **certification recognized at regional or European level** (FR2) as well as to *delivery of programmes on a pan European style engagement* (IE1). Since the conditions will be different in each level, also it is considered that BBECs should push to *foster the implementation of an international quality framework for certification to facilitate the mobility of professionals between countries across Europe* (AT1).

In some cases, it is mentioned the importance to **create a general framework of bioeconomy competences** that include which are the characteristics of bioeconomy professionals and *analyse the competences at different level and redefine the certification, clarifying what are the skills of these high-level or low-level training courses and defining their main characteristics* (IT2).

It is important to reform professional qualifications at the regulatory national level because current laws are not adequate and responsive to current job needs. This would open the possibility of implementing educational programs with nationally recognized certifications. (IT1)

From another point of view, some of the participants considered that BBEC's should provide a **certification scheme not only for the training that it can provide, but the current in-company training provided by companies** to their employees. In the case of The Netherlands *companies offer trainings in industry associations (industry members train others), but this is not certified* (NL1), while in the case of Spain *specific training is carried out in companies, but the certification of these competencies is very complicated, because it is done by the person who supervises the process* (SP2).

In the focus group hold in Spain participants consider that BBEC's may act as a certification agency for this kind of courses. Similar to how ENQA works for universities, *all the activities implemented with the quality seal of BBEC's might be recognised all over Europe* (SP1).

BBEC's might serve as a "Certification agent" to recognize not only the quality of the contents and activities implemented in this kind of training, but also the pedagogical approach and the crosslinking with the research. So, the professionals can use the certifications of these training to access new positions, get a qualification or access other formal training courses.

Implementation of international certification (quality framework) is necessary for competitiveness. (AT1)

In some cases, it is said that **BBEC's should accredit educational centres** (public or private), so *all the training activities implemented by these centres might be directly recognised as valid for other agents* (SP1).

It's important to highlight that some of the participants considered that this kind of certification activities might not be seen by small companies as something important, so it's important to implement activities to create awareness of the importance to provide certifications that can be used by professionals to demonstrate their current knowledge and to access other formal training programs.

In the Ireland (IE1) they consider that the certification & training options should include but not limited to:

- *Level 6 – 9 on the QQI Framework*
- *Special purpose awards and micro credentials*
- *Workplace training programmes linked to HE & FE level talent pipeline*
- *Third level, secondary level and primary school and ECCE outreach*
- *Short programmes for public sector and private sector*
- *Community development training programmes*

Specific examples of certification of training that are not related to the formal training providers are:

- Ecosocial Forum (and some agricultural education centres) fulfil the Ö-Cert basic requirements for adult education organizations and is listed in the directory of Ö-Cert quality providers: <http://www.oe-cert.at> (AT1)
- In Czech Republic the Ministry of Labour gives accreditation to some training providers (CZ1).
- European Bioeconomy University is developing a certification scheme that value soft skills such as collaboration, interdisciplinarity, proactiveness, among others through a project called EBU label (DE1).
- TAPIO in Finland's forestry sector: it shows that the worker has been trained for a certain skill (FI1)
- The Finnish government is establishing a Service centre for continuous learning. FFIF follows the implementation of the centre and is willing to give employer's insights on continuous learning goals. (FI1)
- CERC (Circular Economy Research Centre) (IR1)
- Apulia region, where three specific figures in the agricultural sector (which is the main regional production sector) can certify competences and skills as a formal actor (IT1)
- Friuli Venezia Giulia Region is working at the regional level on skills certification systems, different from the national one (IT2)
- Tecnova, for VET students, has a practice notebook and work log where workers can record their activities with their supervisor (SP2)

- European Network of Quality Assurance (SP1)

4.1.4. BBEC organizational approach

In this section we asked the focus groups' participants to discuss and reflect around the following questions:

- Are there any similar structures in your area related to bioindustry? Do you know any similar structures linked to other sectors of activity? Which ones?
- What kind of other services (not only training) might be provided by BBECs? Which are the target customers/stakeholders that would be interested in these services? Why?
- What stakeholders should collaborate or be involved to provide the described services? How should they be involved?

There is a need to **define and communicate properly what bioeconomy is**, how both SMEs and research organizations can benefit from bioeconomy innovation, as well as to involve training organizations and administrations in the development of these structures.

BBECs should position itself in the genuine education tasks also in dialogue with policy makers, Public Administration, and the society as effective multipliers for a sustainable, circular bioeconomy. (DE1)

BBECs should be the **backbone of a well-structured training and learning systems**, where vocational training and life-long-training step in. Therefore, the flow of knowledge should happen seamlessly, through well-established and effective mechanisms of cross-sectorial cooperation. **The BBECs should be a network and coordinated regionally but also across regions**, fully aligned with national and regional strategies and necessities.

Some stakeholders in the research sector suggested that **BBECs could work as connectors between communication, education and industry and could play the role of synergic management of all these fragmented experiences**, in order to have a stronger impact on the territory (IT3).

In FR2 (France) it's mentioned that there are already some networks and clusters that are putting in contact the industries and the universities and schools. They consider that it's important to think about the added value of BBECs compared to the existing structures. However, in BG1 (Bulgaria), the participants consider that there are no similar structures to what BBECs are supposed to be; they mention the existence of some experiences of regional structures where *science partners work together with the industry to provide systemic education of the workforce in a very lower stages of the training* (BG1). Therefore, more links between universities, other educational centres and industries should be fostered.

Workplace training

As said in one of the focus groups hold in Poland, *graduation should be a start to supplement qualifications already for the needs of given job positions and professional development, such thinking about the learning path could be the key to success* (PL1), so it's important to think about training activities that might help the continuous update of professional's competences while they are developing their activities in different kind of companies and industries.

In the same way, participants in PL1 also considered that BBEC's should **provide educational and vocational counselling services** and help people identify their professional profile and define their competences, as well as support in choosing an educational and professional path, fitting their interests and predispositions (PL1).

On one hand, some participants consider that the BBEC's might **facilitate workplace training**, since they can develop some training in collaboration with the industries where employees can participate to obtain **certifications to recognize their experience**. They consider that BBECs should help to provide *further education opportunities for each staff member from an in-company or out-company point of view* (AT1).

BBECs should include services provided to the bio-industry, to potential employees that want to be trained or requalified, from analysis on the workforce of a biobased company, feasibility of company's transition to a bio-based model (including their workforce reskilling), training certification schemes, to name a few among others. (BG1).

On the other hand, there are some participants that considered that some industries are already providing their employees training activities to update and improve their knowledge. In this case, BBEC's should provide a **valid certification of in-company courses** to facilitate the recognition of these training to access formal education as well as in some qualification process implemented in areas such as Catalonia.

It is important that someone might certify that in-company training is of quality in order to be considered in a process of recognition of work experience (SP1).

Furthermore, the network of companies and educational institutions (universities and VET Schools) is considered important, among others in Finland, France, The Netherlands, and Poland, among others, to provide an opportunity to **facilitate students to do some stages** in the companies to acquire on the job experience before they finish their studies.

It is particularly interesting to allow students to train on industrial platforms. (FR3)

Companies to contribute to the learning process by providing practical tasks to the students. (F1)

Programs consisting in part-time education at university/part-time in companies can be of interest there. (NL1)

There are large enterprises that can boast of successful cooperation with the environment, patronize secondary schools, offer internships and apprenticeships to educate people in whom they will employ in the future. (PL1)

There is some experience with students doing stages in VET education, but it should be something compulsory in bachelor and master's degrees, since students might know how it's the real world in the companies, not only in the academia. (SP1).

In the case of Denmark, they have some experience in activities where students from vocational education can meet researchers as well as professionals from the industry when they are studying.

The **work-based learning** was pointed out as crucial, it's important to *strengthen and enhance apprenticeships and to conceive them as investing projects for companies aiming at training a person who then becomes an added value for the company itself (IT3)*. It was also noted *the urgency to complete the training of all those figures who already operate in the industrial sectors by strengthening their training in the biobased sector, favoring the entry of new external professionals (e.g., biologists, chemists, etc.), who have an important role in the bio transition, and by integrating new specific figures that can have a sustainability advisory role for the industry (IT1)*.

Some focus groups agree that it is not a question of completely overturning the education system, but an **opportunity to create completely new professional roles**, building on the technical and cultural knowledge acquired and that are part of the current consolidated model. Dynamic and heterogeneous training courses are necessary to respond to internal capacity building needs of companies, *but this is also very complex (...) BBEC's regional structure should respond to different target beneficiaries, having specific interests and diverse education objectives (IT2)*. In the same way, there are participants that considered that *Competences needed in the area of bioeconomy should be discussed in an interdisciplinary, cross-sectoral manner (PL1)*.

Society openness

The BBEC are considered by participants as a place to **promote lifelong learning related to bioeconomy**, from school to retired people, through VET centres, universities and continuous training in companies. Furthermore, it is considered that it

should focus its efforts to implement specific activities adapted to any kind of stakeholder that should be aware about the bioeconomy.

Some of the participant also consider that the BBECs should be open to the society to **approximate science to the society**, as well as to offer activities **to raise awareness about the bioeconomy**.

More broadly, they should be open to the general public, to enable them to grasp the concept of the bioeconomy. (FR1)

BBECs could also be a point of reference for civil society and industries in order to increase awareness and communication on the bioeconomy: this was identified as a crucial step to move toward the recognition and appreciation of these new professional figures with the final objective of attracting work and educational careers. (IT1)

In that way, some of the participants in the focus group also consider that the activities open to the society might be **focused to some specific groups** where it is important to improve awareness if we want to achieve a change of culture and people's mindset. For example, they mention the preparation of briefings for politicians regarding the situation of bioeconomy in the region, specific events for decision makers or activities to raise awareness of employers about the importance of facilitate training activities to their employees.

Educational activities to raise awareness and inform regional policy actors as well as public procurers is recognized as key element to boost the transition. (IT4).

BBEC can support stakeholder organizations, communication, and dissemination of bioeconomy education. (CZ1)

(...) accelerate the realization of training programs which are more inclusive for all the value chain players (consumers, primary sectors), in order to support a cultural change and not just an industrial one. (IT1)

Involve employers in various events, communicate to them about the benefits of bioeconomy for their businesses and encourage them to promote and support this idea among employees, e.g., providing access to free training, bonuses and promotion. The idea is to motivate employees to take up the topic of bioeconomy so that it has influence on their careers. (PL1)

More focused on the industries, participants in focus group IT3 consider that BBECs should implement activities to **stimulate and promote mindset change by providing inspirational success stories**, understanding the market needs in relation to consumers' demand, mapping and coordinating the supply chains needs in its entirety,

identifying weakness and suggest solutions, connecting value chains stakeholders and facilitating dialogue and mutual learning

Other services

The participants in the Focus Group consider that BBECs can provide other services a part of training. In that way, they mention the possibility to provide **consultancy services**, since experts are supposed to be linked with the centre. Some of the services mentioned are:

Support of a project to set up an industrial unit, to assess the potential environmental impacts, the effects on existing activities, and to evaluate the sustainability of the project. (FR1)

In any case, a **register of certified experts on the bioeconomy** has been identified as a tool to facilitate and attract industries looking for external advisors for sustainability. Some of the consultancy services that might be offered by BBEC are related business consulting, scouting approach, communication, marketing, social responsibility, etc.

What is more, some of the participants consider that the BBECs should not be only focused on training and facilitator of knowledge transfer between different kind of stakeholders, but to provide **services to enable industries to test and evaluate their equipment**. Therefore, some participants also mention that BBEC's *should rent laboratories and other facilities, such as FabLabs, that are often in demand by stakeholders or other projects (AT1)*. They also consider that these facilities should be **available to students to test their projects** and learn how a project could be translated from theory in to practice.

Internationalization

Since BBECs should be developed and implemented considering international consortiums, some of the participants consider that this will be also a strength of the centres that should be exploited. The BBECs should enable to **share information between different regions** where the industrial and educational contexts are similar, as well as to help each other exchanging knowledge and previous results.

What would be useful is an open European federation of bioeconomy centres to share and hybridize. It would be necessary to scale up, by creating a network of structures. Even if there are exchanges today, they are insufficient. You also must learn to work with the diversity of cultures, which overlaps with the diversity of skills (FR3)

At the same time, in countries like Italy it is considered that not only internationalization is necessary, but also to foster the *dialogue between regional and national level*,

because in Italy directives may differ from each region, due to regional autonomy and it's important to have a more integrated approach (IT3).

It is also mentioned that the **exchange of good practices** will be necessary, not only between industries but at administration levels at regional, national and international level.

BBECs can play a role in collecting, diffusing, and transforming in case studies inspirational experiences. (IT3)

BBECs on the EU scale, an important task will undoubtedly be cooperation with such centres in other countries as well as the exchange of experiences and mutual learning. (PL2)

Networking

The BBEC's should implement formal and non-formal activities to **facilitate networking between different stakeholders**, since *educational programs and other mutual learning and debate activities, engaging institutional actors are fundamental to have more structured calls, financing grants, with lines of interventions and clear objectives able to really intercept the needs of companies aiming to embrace more sustainable processes (IT4).*

Educational centres of the bioeconomy could cover the role of evaluating and aligning the contents of training courses and promoting dialogue with stakeholders. (IT3)

From the training point of view, some of the participants highlight that it's important to develop **activities to further foster and develop collaboration and bridges between the different training stakeholders** such as schools, high schools, VET providers and Universities. The BBECs should play an important role to put them together and promote actions where they can collaborate providing training, *keeping a close collaboration between them and companies, so the education centres will know the needs of the companies (F11)*, but we should consider that *rethinking a regional education hub is a complex task. There is lack of coordination among educational levels (IT2).*

The BBEC could be envisaged as the epicentre for the circular bioeconomy connecting these disparate strands, consolidating, and coordinating the activities of a nationwide network. (IE1)

As it is said during one of the focus groups, *we must share skills between training systems and allow industry to benefit from this sharing (FR3)*. Furthermore, the BBEC's can be a **bank of resources of didactic and training materials**, and they *might provide materials and resources linked to thematic issues tailored to the respective age of the pupils (AT1)* to the education stakeholders.

Furthermore, it is mentioned the importance of **collaboration with and active involvement of the industry itself, trade unions as workers' representatives, other training institutions (including private training providers), public organisations at the local level, companies across the value chain that are transitioning to a bio-based model** (BG1). It is also important to consider the involvement of **employment and innovation agencies that will have to deal with enhancing the skills required by bioindustry** (IT1).

In Spain it's considered that **agreements between industries and educational centres (VET schools and universities) could be useful when industries want to innovate**. Industry can provide the educational centre resources, and the students and professors, together with the industry professionals, can develop the innovation. With this agreement students can learn and get an academic recognition, while the industry can get the product developed.

In AT1 focus group some of the participants agree on the idea that it's important to involve the industries in the activities developed by BBECs, but they consider that sometimes it's difficult *because companies are asking for cooperation with universities/technical schools for further education of experts, but problems with the implementation due to different opinions concerning financing (industry is mostly not generous and not enough proactive, in contrary they expect subsidies through the public sector)* (AT1)

There are other focus groups where participants agree on this idea, since they consider that *BBECs should be market-driven and ensure that primarily private capital becomes the major revenue stream, rather than public funding; BBECs shall receive their major funding from services provided to biobased industries, and then individuals that wish to benefit from these* (BG1).

According to the Industrial association representative participating in IT2, collaboration might be achieve creating **education centre in thematic districts**; these centres could stimulate the debate on common challenges, connect value chains actors (at different levels) and provide capacity building.

It's important to highlight that there are participants in the focus group that considers that **networks should be strong to attract people and organizations** to participate on it.

Before it was something good to belong to networks, but now we receive a lot of offers from different networks, but not all of them are strong enough to prosper or offer something interesting to the industry (...) The communication between the different actors will be a challenge. (DE1)

Profile of BBECs staff

It's important to include *new professional figures, like sustainability advisors and consultants, to support industries to embrace the bio transition (...) their profile should be managerial based, extremely creative in promoting systemic growth operations at a territorial level, acting as a connector of the supply chains (IT1).*

In the case of Italy, it is mentioned the case of Federpesca, where they involve intermediate actors, which in that case are the federation officers: they are always updated about bioeconomy and circular economy training offers and also the needs of the sector, so that it's easy for them to *bring together the offer of education and the possible request of it (IT5)*

BBEC's business model

Some questions raised in FR2 regarding the economic model of BBEC.

- How many partners should be involved to consider that is feasible to open a BBEC?
- How do we pretend to cover the costs of exploitation?
- Should it be through fees paid by institutional partners?
- Should it be through fees covered by those using the services (training, assessment, certification, etc.)?

In the case of Germany and Poland, they summarize the activities that should be implemented by BBEC as following

- *Include business economists and lawyers*
- *Include and/or create new business models framed in the value networks, for small, medium, and large companies.*
- *Some important topics that could frame the BBECs are: social responsibility, communication, marketing, professional counselling, etc...*
- *Offer services such as business consulting, scouting approach.*
- *Offer physical exchange platform to understand the business operation from other areas.*
- *Scouting or consulting from external actors. Perspective of others in own business operation and develop new concepts.*
- *BBECs should position itself in the genuine education tasks also in dialogue with policy, administration, and the society as effective multipliers for a sustainable, circular bioeconomy.*
- *It is important to integrate the stakeholders (small and medium enterprises, farmers, cooperatives, etc.). The communication between the different actors will be a challenge.*

- *Implement experimental forms of education, based on many ways of learning: from each other, through experience, etc.*
- *Support the understanding and awareness of the benefits of operating in the bioeconomy sector.*
- *Be based on a network of stakeholders who feel part of the bioeconomy, regardless of how they are labelled (e.g., by the Polish classification of activities) and represent economic entities of various sizes.*
- *Provide short training cycles that will enable dynamic replenishment of competences missing on the labour market.*

Some other experiences provided where it's possible to do some benchmarking were:

ID	Type	Information and website (if available)
AT1	Networks	Austrian Bioeconomy Strategy (https://bit.ly/3x9Qn94)
FR1	Campus	CRITT Bois (https://www.crittbois.com/)
FR1	Cluster	EnergieVie fibre cluster (http://www.fibres-energivie.eu/)
FR1	Cluster	IAR cluster (https://www.iar-pole.com/)
FR1	Innovation Hub	SATT Sayens (https://www.sayens.fr/)
FR1	Project	DHDA (https://www.deshommesetdesarbres.org/)
FR1	Innovation Lab	Terralab (https://terralab.fr/)
FR1	Cluster / Innovation Hub	Planet A initiative (https://www.planet-a-initiative.com/section/presse/?lang=fr)
FR2	Network	Biomolecules and 3BR (https://draaf.grand-est.agriculture.gouv.fr/IMG/pdf/UNIV-LORRAINE_cle84a5ab.pdf)
FR2	Cluster	Fibres EnergieVie (http://www.fibres-energivie.eu/),
FR2	Cluster	XyloFutur Cluster (http://xylofutur.fr/)
FR2	Campus	Campuses of trades and qualifications (https://www.education.gouv.fr/les-campus-des-metiers-et-des-qualifications-5075).
FR2	Jobs	Fibois (https://metiers.fibois-grandest.com/)

FR2	Network	Vosj'Innove (https://www.vosjinnove.fr/)
FR2	Innovation Hub	CRITT Chimie NovaChim (https://www.novachim.fr/)
FR3	Innovation Hub	CEBB (https://cebb-innovation.eu/Home/)
FR3	Cluster	Genopole à Toulouse (https://www.genopole.fr/)
CZ1	Innovation Hub	BIOEAST HUB CZ (http://www.bio-hub.cz/)
DK1	Educational Centre	Viborg Municipality, Asmildkloster farming vocational education and Aarhus University
FI1	Educational Centre	European Bioeconomy University network (EuBioNet)
FI1	Innovation Hub	European Sustainable Energy Innovation Alliance
IE1	Research	Dublin Molecular Medicine Centre (DMMC)
IE1	Network	BEC is Ireland's largest lobby and business representative group
IE1	Educational Centre	TEGASC, the Agriculture and Food Development Authority is the national body providing integrated research, advisory and training services to the agriculture and food industry and rural communities
IE1	Educational Centre	The Rediscovery Centre, which is the National Centre for the Circular Economy
IE1	Innovation Hub	BEACON, works on converting biomass and bio-industry wastes into biobased products with commercial applications
IE1	Cluster	Enrol Yourself, an alternative educational model where peer learning groups are as ubiquitous as universities
IE1	Network	SOLAS Green Skills Action
IT3	Network	The European Alliance for Apprenticeships
IT5	Cluster	Blue Italian Growth
SP2	Educational Centre	University of Almeria and University of Granada – Master of Biotechnology.
SP2	Network	Alianza FP Dual in Andalusia



SP2	Cluster	Andalusian Cluster of Circular Bioeconomy
SP1	Network	ECIU – Network of Universitys working through challenge-based learning.



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4.2. Survey's results

In this section the results of the survey are presented using descriptive statistics. Since the sample was not big enough, it was not possible to apply other statistical analysis to know if there are difference between the different countries. However, and still using a descriptive approach, we analyse the data considering four different European Areas.

Table 5 : Sample of survey participants by country

Area	Country	Number of participants	Percentage
Central Europe + Ireland	Austria	30	32,9 %
	France	15	
	Germany	13	
	Netherlands	1	
	Ireland	11	
Mediterranean Europe	Greece	2	42,7%
	Italy	30	
	Spain	59	
North Europe	Denmark	4	8,9%
	Finland	10	
	Norway	2	
	Sweden	3	
East Europe	Bulgaria	6	15,5%
	Czech Republic	3	
	Estonia	1	
	Poland	22	
	Slovakia	1	

The participants were asked in the survey if they agree or disagree with some statements. They could answer according to a 5 levels Likert scale, where 1 was "strongly disagree" and 5 "strongly agree", with a middle answer (3) for those that "Neither Agree nor Disagree".

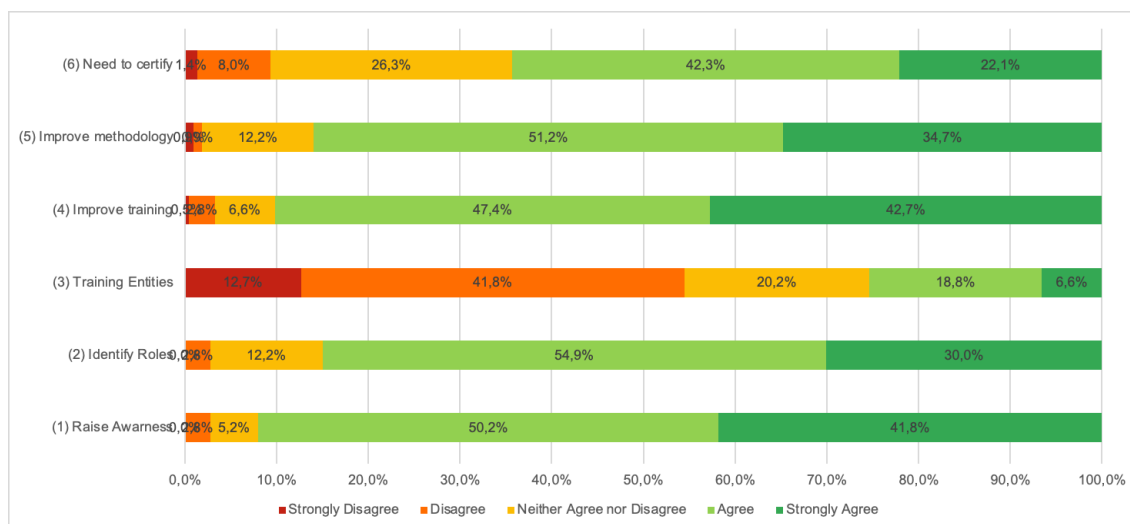
4.2.1. Current situation

The first group of questions objective was to know which is the current situation regarding the following topics:

- (1) In my region, there is a need to raise awareness about the bioeconomy and circular economy
- (2) In my region, it's still necessary to identify which are going to be the main professional roles in the field of bioeconomy and circular economy
- (3) In my region, there are enough entities providing training activities in the field of bioeconomy and circular economy
- (4) In my region, there is a need to improve bioeconomy and circular economy education giving the students more opportunities to learn about the bio-based industry sector
- (5) In my region, there is a need to improve the methodologies used to teach bioeconomy and circular economy to promote the acquisition and domain of soft skills (communication skills, teamwork, entrepreneurship, innovation mindset, etc.)
- (6) In my region, it's necessary to certify the competences acquired through the experience in the workplace, for professionals working in bio industries

In the following figure the distribution of the answers, for all the statements, between the Likert scale.

Figure 5 : First group of questions distribution of the answers in the Likert scale (all sample)



The following figure shows the mean of the statements considering the whole sample.

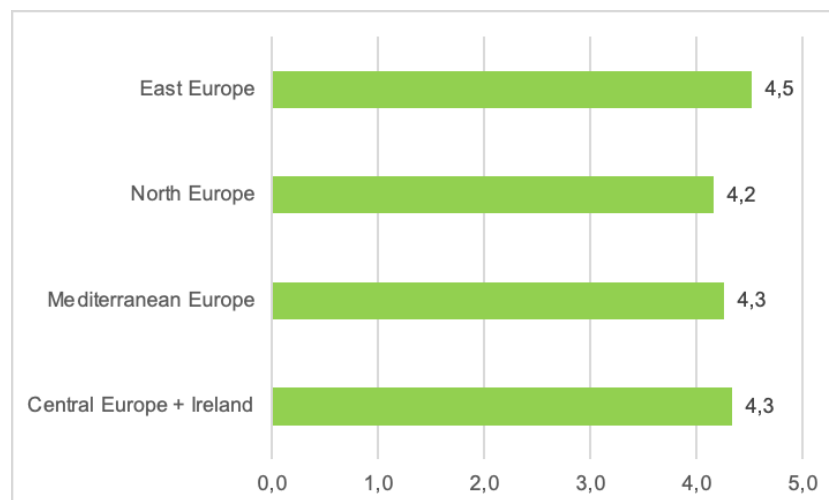
Figure 6: First group of questions mean (all sample)



In the case of the statement 1, related to the **need to raise awareness about the bioeconomy and circular economy**, most of the participants agree (50,2%) and strongly agree (41,8%) in the statement. In the scale of 5, the mean of this answer is 4,31 (SD: 0,70), the mode is 4 and the median is 4.

The analysis of the mean in the considered European Areas (next figure) shows that there are no big differences between the areas, since the lower mean is in North Europe, with 4,2 points (SD: 0,9) and the higher mean is in East Europe with 4,5 points (SD: 0,5). In the case of Central Europe and Mediterranean Europe the mean is the same, with 4,3 points and the same 0,7 SD.

Figure 7: Means per European Area regarding the need to raise awareness about bioeconomy and circular economy.



The analysis of the median and the mode is shown in the following table, where it can be seen that the median and mode is 4 for all the areas except for East Europe, where these two values are 5.

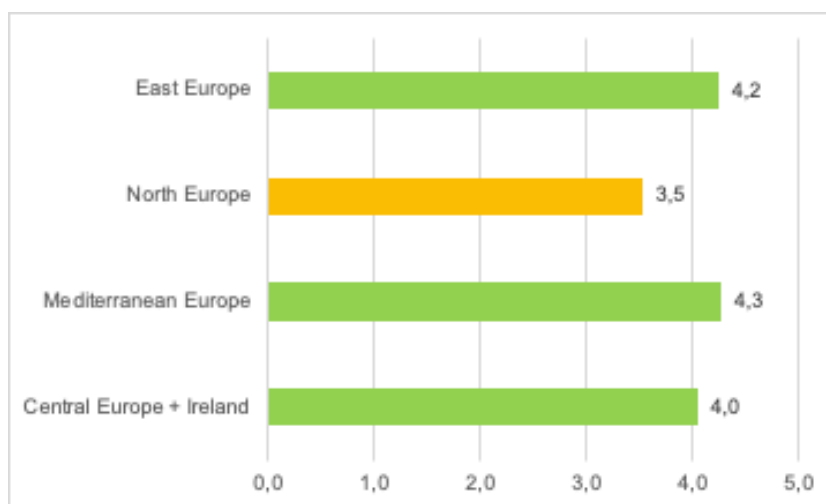
Table 6: Mode and median per area regarding the need to raise awareness about bioeconomy and circular economy.

Area	Median	Mode
Central Europe + Ireland	4,0	4,0
Mediterranean Europe	4,0	4,0
North Europe	4,0	4,0
East Europe	5,0	5,0

For the statement 2, related to the **need to identify which are going to be the main professional roles in the field of bioeconomy and circular economy**, it can be seen that most of the participants agree (54,9%) and strongly agree (30%) in the statement. In the scale of 5, the mean of this answer is 4,12 (SD: 0,72), the mode is 4 and the median is 4.

The analysis of the mean in the considered European Areas (next figure) shows that there are some differences between the areas, since the lower media is in North Europe, with 3,5 points (SD: 1,0) and the higher media is in Mediterranean Europe with 4,3 points (SD: 0,6). In the case of East Europe, the mean is 4,2 (SD: 0,5) and for Central Europe the mean is 4 (SD: 0,8).

Figure 8: Means per area regarding the need to identify the main professional roles in the future.



The analysis of the median and the Mode is shown in the following table, where it can be seen that the median and mode is 4 for all the areas.

Table 7: Mode and median per area regarding the need to identify the main professional roles in the future

Area	Median	Mode
Central Europe + Ireland	4,0	4,0
Mediterranean Europe	4,0	4,0
North Europe	4,0	4,0
East Europe	4,0	4,0

In the case of the statement 3, where it was asked if **there are enough entities providing training activities in the field of bioeconomy and circular economy**, it can be seen that most of the participants selected disagree and strongly disagree (41,8% and 12,7%), and 20,2% of them neither agree nor disagree. Only 6,6% strongly agree and the option agree was selected by 18,2% of the participants. In the scale of 5, the mean of this answer is 2,65 (SD: 1,12), the mode is 4 and the median is 4. In this case, the lower mean implies that participants consider that there are not enough entities.

The analysis of the mean in the considered European Areas (next figure) shows that there are differences between the areas, since the higher media is in North Europe, with 3,4 points (SD: 1,4) and the lower media is in East Europe with 2,1 points (SD: 0,9). In the case of Mediterranean Europe, the mean is 2,6 (SD: 1,0) and for Central Europe the mean is 2,7 (SD: 1,0).

Figure 9: Means per area regarding the presence of enough entities providing activities in the field of bioeconomy and circular economy.



The analysis of the median and the mode is shown in the following table, where some differences can be seen. While in the case of Central Europe, Mediterranean Europe

and East Europe the mode is 2,0, in the case of North Europe the mode is 5,0. The median is different in each case.

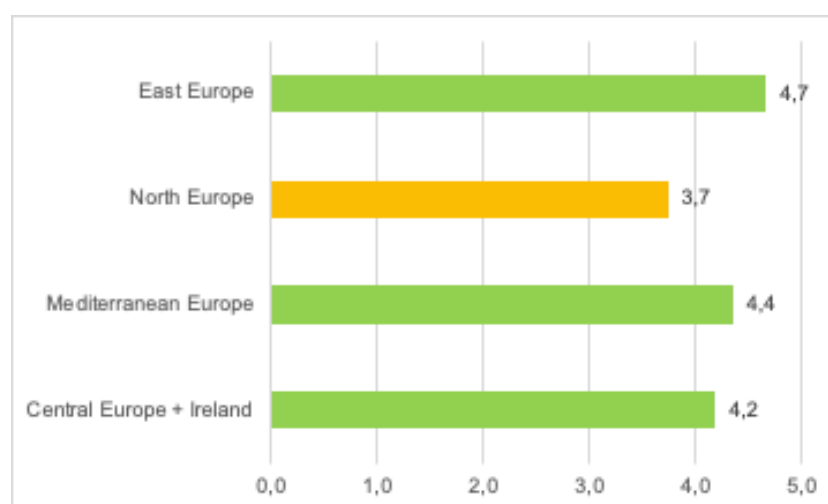
Table 8: Mode and median per area regarding the presence of enough entities providing activities in the field of bioeconomy and circular economy.

Area	Median	Mode
Central Europe + Ireland	2,0	2,0
Mediterranean Europe	3,0	2,0
North Europe	4,0	5,0
East Europe	2,0	2,0

For the statement 4, related to the **need to improve bioeconomy and circular economy education giving the students more opportunities to learn about the bio-based industry sector**, most of the participants agree (47,4%) and strongly agree (42,7%) in the statement. In the scale of 5, the mean of this answer is 4,29 (SD: 0,75), the mode is 4 and the median is 4.

The analysis of the mean in the considered European Areas (next figure) shows that there are some differences between the areas, since the lower media is in North Europe, with 3,7 points (SD: 1,0) and the higher media is in East Europe with 4,7 points (SD: 0,5). In the case of Mediterranean Europe, the mean is 4,4 (SD: 0,6) and for Central Europe the mean is 4,2 (SD: 0,8).

Figure 10: Means per area regarding the need to improve bioeconomy and circular economy education.



The analysis of the median and the mode is shown in the following table, where it can be seen that the median and mode is 4 for all the areas, except for the East Europe, where both are 5.

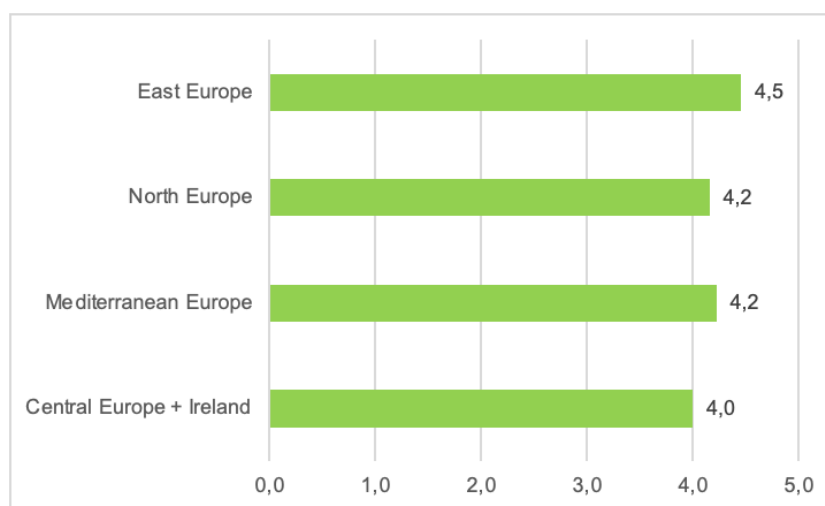
Table 9: Mode and median per area regarding the need to improve bioeconomy and circular economy education

Area	Median	Mode
Central Europe + Ireland	4,0	4,0
Mediterranean Europe	4,0	4,0
North Europe	4,0	4,0
East Europe	5,0	5,0

In the case of the statement 5, related to the **need to improve the methodologies used to teach bioeconomy and circular economy to promote the acquisition and domain of soft skills**, most of the participants agree (51,2%) and strongly agree (34,7%) in the statement. In the scale of 5, the mean of this answer is 4,18 (SD: 0,75), the mode is 4 and the median is 4.

The analysis of the mean in the considered European Areas (next figure) shows that there are no big differences between the areas, since the lower mean is in Central Europe, with 4,0 points (SD: 0,9) and the higher mean is in East Europe with 4,5 points (SD: 0,6). In the case of North Europe and Mediterranean Europe the mean is the same, with 4,2 points and the same 0,7 SD.

Figure 11: Means per European Area regarding the need to improve the methodologies used to promote soft skills.



The analysis of the median and the mode is shown in the following table, where it can be seen that the median and mode is 4 for all the areas.

Table 10: Mode and median per area regarding the need to improve the methodologies used to promote soft skills.

Area	Median	Mode
Central Europe + Ireland	4,0	4,0
Mediterranean Europe	4,0	4,0
North Europe	4,0	4,0
East Europe	4,0	4,0

Finally, the statement 6, related to the **need to certify the competences acquired through the experience in the workplace, for professionals working in bio industries**, it can be seen that most of the participants agree (42,3%) and strongly agree (22,1%) in the statement. There is also a high number of participants that neither agree nor disagree (26,3%). In the scale of 5, the mean of this answer is 3,76 (SD: 0,93), the mode is 4 and the median is 4.

The analysis of the mean in the considered European Areas (next figure) shows that the lower mean is in North Europe, with 3,5 points (SD: 1,0), closely followed by Central Europe with 3,6 points (SD: 1,0) The higher mean is in East Europe with 4,0 points (SD: 0,8), followed by Mediterranean Europe which mean is 3,9 points (SD: 0,7).

Figure 12: Means per European Area regarding need to certify the competences acquired through the experience in the workplace.



The analysis of the median and the mode is shown in the following table, where median and mode is 4 for all the areas except for North Europe, where both indicators are 3.

Table 11: Mode and median per area regarding the need to certify the competences acquired through the experience in the workplace.

Area	Median	Mode
Central Europe + Ireland	4,0	4,0
Mediterranean Europe	4,0	4,0
North Europe	3,0	3,0
East Europe	4,0	4,0

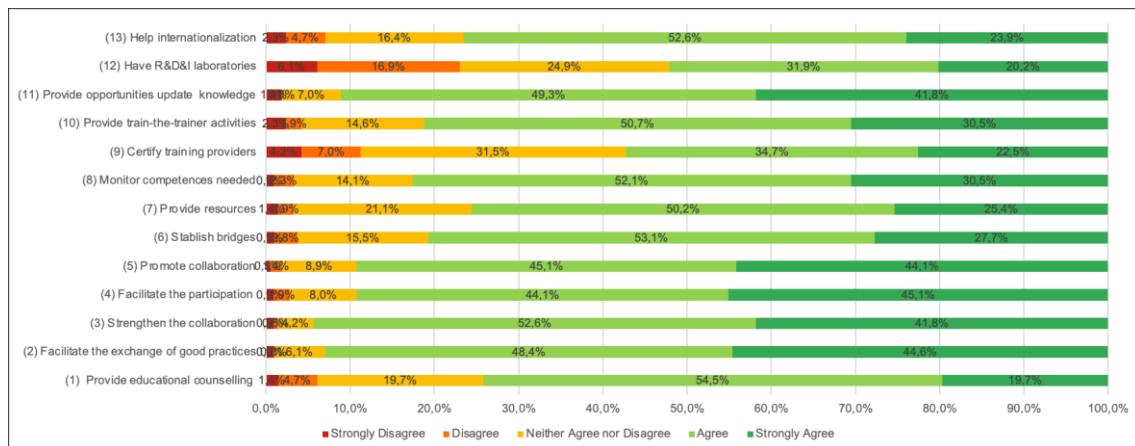
4.2.2. Desirable situation

The second group of questions objective was to know which the desirable situation of the participants is considering what BBECs should provide. The statements provided to them to express their agreement or disagreement were:

- (1) BBEC should provide educational and vocational counselling services
- (2) BBEC should facilitate the exchange of good practices between different regions
- (3) BBEC should strengthen the collaboration of companies and educational institutions through the design and execution of joint training projects
- (4) BBEC should facilitate the participation of the industry in the educational process (e.g., guest lectures, thesis, scholarships, internships, etc.)
- (5) BBEC should promote collaboration of companies and educational institutions to implement bioeconomy and circular economy joint innovation projects
- (6) BBEC should establish bridges between different levels of education and collaboration among training providers
- (7) BBEC should provide resources and training materials to educational institutions
- (8) BBEC should monitor the dynamics of the bioeconomy and circular economy to identify the current and future competences needed in the sector
- (9) BBEC should certify providers of bioeconomy and circular economy training to ensure they are aligned with real industry needs
- (10) BBEC should provide train-the-trainer activities to update the pedagogical competences of teachers, professors and trainers in the bioeconomy and circular economy
- (11) BBEC should provide opportunities to teachers, professors and trainers to update their knowledge and competence regarding bioeconomy and circular economy
- (12) BBEC should have laboratories and other equipment to support R&D&I and the innovation-related activities of companies
- (13) BBEC should help companies in opening their doors to international cooperation

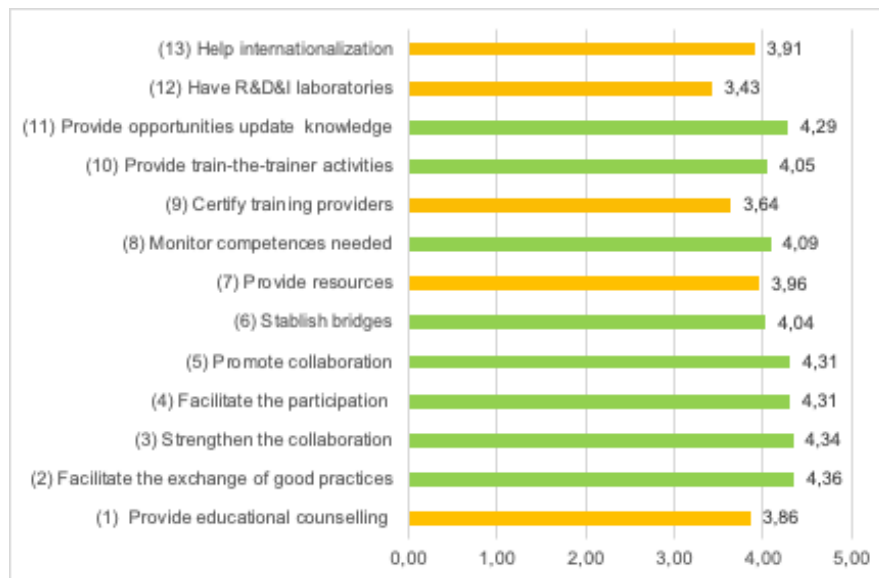
In the following figure the distribution of the answers for all the statements between the Likert scale are represented.

Figure 13: Distribution of the answers for the desirable situation in the Likert scales (all sample)



The following figure shows the mean of the statements considering the whole sample.

Figure 14: Mean of the answers for the desirable situation in the Likert scales (all sample)



In the case of the statement 1 “**BBEC should provide educational and vocational counselling services**”, it can be seen that most of the participants agree (54,5%) and strongly agree (19,7%) in the statement. In the scale of 5, the mean of this answer is 3,86 (SD: 0,83), the mode is 4 and the median is 4.

The analysis of the mean in the considered European Areas (next figure) shows that there are some differences between the areas, since the lower mean is in North Europe, with 3,2 points (SD: 1,2) and the higher mean is in East Europe with 4,2 points (SD: 0,7). In the case of Mediterranean Europe, the mean 3,9 (SD: 0,7) and for Central Europe the mean 3,8 (SD: 0,9).

Figure 15: Means per European Area for “BBEC should provide educational and vocational counselling services”.



The analysis of the median and the mode is shown in the following table, where it can be seen that the median and mode is 4 for all the areas except for North Europe, where median is 3.

Table 12: Mode and median per Area for “BBEC should provide educational and vocational counselling services”.

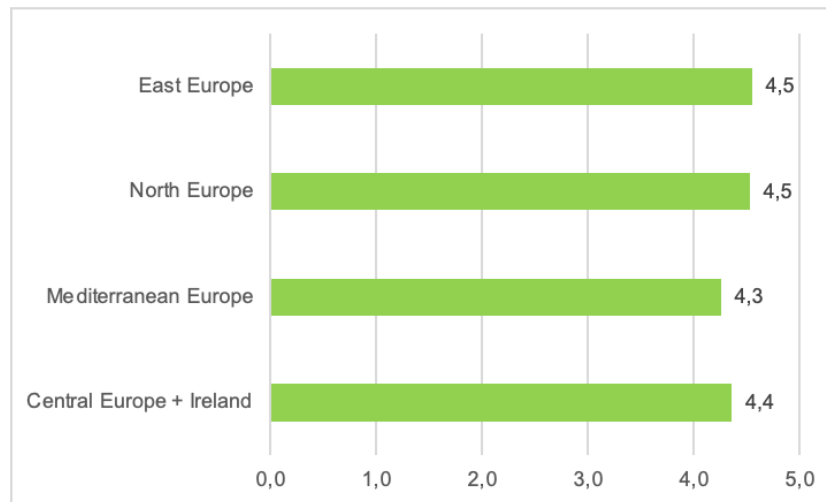
Area	Median	Mode
Central Europe + Ireland	4,0	4,0
Mediterranean Europe	4,0	4,0
North Europe	3,0	4,0
East Europe	4,0	4,0

In the case of the statement 2 “**BBEC should facilitate the exchange of good practices between different regions**”, it can be seen that most of the participants agree (48,4%) and strongly agree (44,6%) in the statement. In the scale of 5, the mean of this answer is 4,36 (SD: 0,68), the mode is 4 and the median is 4.

The analysis of the mean in the considered European Areas (next figure) shows that there are small differences between the areas, since the lower mean is in Mediterranean Europe, with 4,3 points (SD: 0,6) and the higher mean is in East Europe

and North Europe, with 4,5 (SD: 0,6) points in both cases. In the case of Mediterranean Europe, the mean 4,3 (SD: 0,6).

Figure 16: Means per European Area for “BBEC should facilitate the exchange of good practices between different regions”.



The analysis of the median and the mode is shown in the following table, where the median and mode is 5 for North Europe and East Europe and 4 for Mediterranean Europe. In the case of Central Europe, the median is 4,5 and the mode 5.

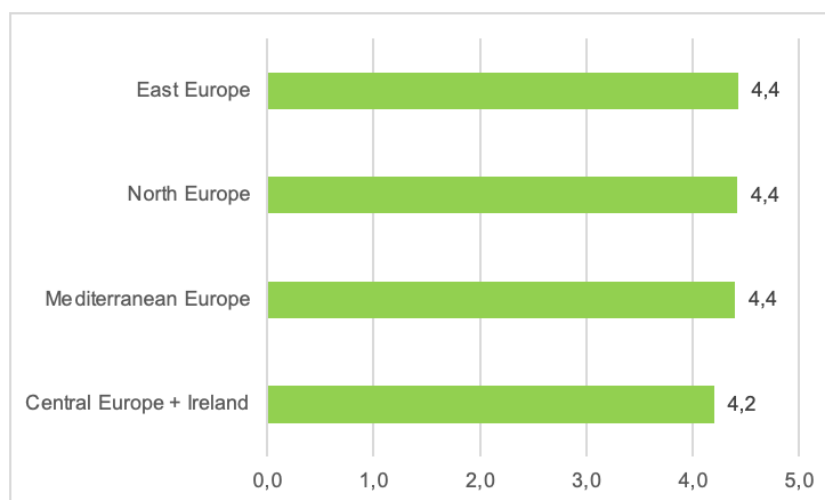
Table 13: Mode and median per Area for “BBEC should facilitate the exchange of good practices between different regions”.

Area	Median	Mode
Central Europe + Ireland	4,5	5,0
Mediterranean Europe	4,0	4,0
North Europe	5,0	5,0
East Europe	5,0	5,0

For statement 3 “**BBEC should strengthen the collaboration of companies and educational institutions through the design and execution of joint training projects**”, it can be seen that most of the participants agree (52,6%) and strongly agree (41,8%) in the statement. In the scale of 5, the mean of this answer is 4,34 (SD: 0,67), the mode is 4 and the median is 4.

The analysis of the mean in the considered European Areas (next figure) shows that there are small differences between the areas, since the lower mean is in Central Europe, with 4,2 points (SD: 0,8) and the other areas have the same mean of 4,4, with SD of 0,6 in the Mediterranean Europe and SD of 0,5 in North Europe and East Europe.

Figure 17: Means per European Area for “BBEC should strengthen the collaboration of companies and educational institutions”.



The analysis of the median and the mode is shown in the following table, where the median and mode is 4 for all the regions.

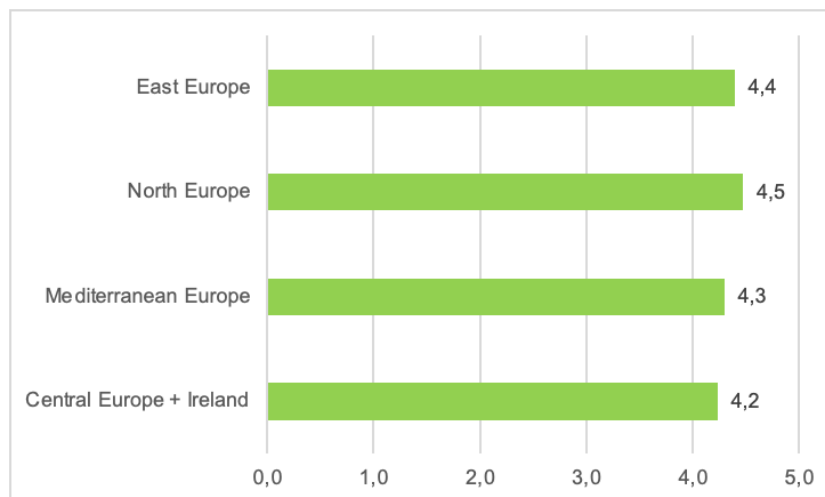
Table 14: Mode and median per Area for “BBEC should strengthen the collaboration of companies and educational institutions”.

Area	Median	Mode
Central Europe + Ireland	4,0	4,0
Mediterranean Europe	4,0	4,0
North Europe	4,0	4,0
East Europe	4,0	4,0

In the case of the statement 4 “**BBEC should facilitate the participation of the industry in the educational process (e.g., guest lectures, thesis, scholarships, internships, etc.)**”, it can be seen that most of the participants strongly agree (45,1%) and agree (45,1%) in the statement. In the scale of 5, the mean of this answer is 4,31 (SD: 0,77), the mode is 5 and the median is 4.

The analysis of the mean in the considered European Areas (next figure) shows that there are small differences between the areas, since the lower mean is in Central Europe, with 4,2 points (SD: 0,9) and the higher mean is in North Europe, with 4,5 (SD: 0,7). East Europe mean is 4,4 (SD: 0,6) and the Mediterranean Europe mean is 4,3 (SD: 0,8).

Figure 18: Means per European Area for “BBEC should facilitate the participation of the industry in the educational process”.



The analysis of the median and the mode is shown in the following table, where the median is 4 for all the regions except North Europe, where it is 5. In the case of the mode, in Central Europe and North Europe is 5, and in Mediterranean Europe and East Europe is 4.

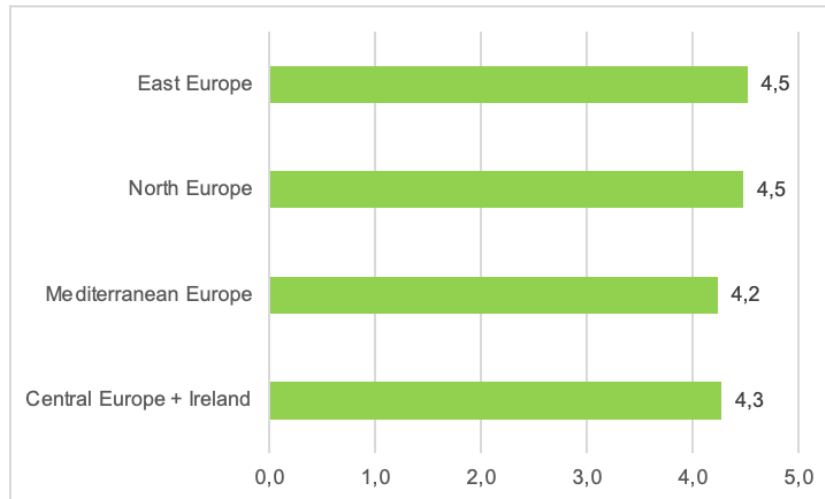
Table 15: Mode and median per Area for “BBEC should facilitate the participation of the industry in the educational process”.

Area	Median	Mode
Central Europe + Ireland	4,0	5,0
Mediterranean Europe	4,0	4,0
North Europe	5,0	5,0
East Europe	4,0	4,0

For statement 5 “**BBEC should promote collaboration of companies and educational institutions to implement bioeconomy and circular economy joint innovation projects**”, it can be seen that most of the participants agree (45,1%) and strongly agree (44,1%) in the statement. In the scale of 5, the mean of this answer is 4,31 (SD: 0,73), the mode is 4 and the median is 4.

The analysis of the mean in the considered European Areas (next figure) shows that there are small differences between the areas, since the lower mean is in Mediterranean Europe, with 4,2 points (SD: 0,7) and the higher areas are East Europe and North Europe with a mean of 4,5 and an SD of 0,5 and 0,7 respectively. In the case of Central Europe, the mean is 4,3 (SD: 0,8).

Figure 19: Means per European Area for “BBEC should promote collaboration of companies and educational institutions”.



The analysis of the median and the mode is shown in the following table, where the median and mode is 4 in Central Europe and Mediterranean Europe, and 5 in North Europe and East Europe.

Table 16: Mode and median per Area for “BBEC should promote collaboration of companies and educational institutions”.

Area	Median	Mode
Central Europe + Ireland	4,0	4,0
Mediterranean Europe	4,0	4,0
North Europe	5,0	5,0
East Europe	5,0	5,0

For statement 6 “BBEC should stablish bridges between different levels of education and collaboration among training providers”, it can be seen that most of the participants agree (53,1%) and strongly agree (27,7%) in the statement. In the scale of 5, the mean of this answer is 4,04 (SD: 0,79), the mode is 4 and the median is 4.

The analysis of the mean in the considered European Areas (next figure) shows that there are differences between the areas. The lower mean is 3,9 and it appears in Central Europe (SD: 1) and North Europe (SD: 0,2). The higher mean is in East Europe, with 4,3 (SD: 0,6) followed by Mediterranean Europe, where the mean is 4,1 (SD: 0,8).

Figure 20: Means per European Area for “BBEC should stablish bridges between different levels of education”.



The analysis of the median and the mode is shown in the following table, where the median and mode is 4 in all the areas.

Table 17: Mode and median per Area for “BBEC should stablish bridges between different levels of education”.

Area	Median	Mode
Central Europe + Ireland	4,0	4,0
Mediterranean Europe	4,0	4,0
North Europe	4,0	4,0
East Europe	4,0	4,0

In the case of the statement 7 “**BBEC should provide resources and training materials to educational institutions**”, it can be seen that most of the participants strongly agree (50,2%) and agree (25,4%) in the statement. In the scale of 5, the mean of this answer is 3,96 (SD: 0,82), the mode is 4 and the median is 4.

The analysis of the mean in the considered European Areas (next figure) shows that there are differences between the areas, since the lower mean is in North Europe, with 3,2 points (SD: 1,1) and the higher mean is in East Europe, with 4,2 (SD: 0,6). Mediterranean Europe and Central Europe mean is 4,0, with SD of 0,7 and 0,9 respectively.



Figure 21: Means per European Area for “BBEC should provide resources and training materials to educational institutions”.



The analysis of the median and the mode is shown in the following table, where the median is 4 for all the regions except North Europe, where it is 3. The mode is 4 in all the regions.

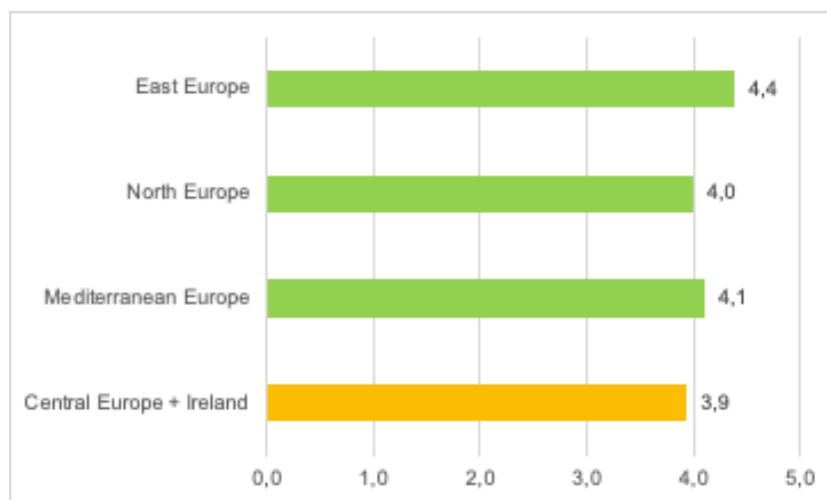
Table 18: Mode and median per Area for “BBEC should provide resources and training materials to educational institutions”.

Area	Median	Mode
Central Europe + Ireland	4,0	4,0
Mediterranean Europe	4,0	4,0
North Europe	3,0	4,0
East Europe	4,0	4,0

For statement 8 “**BBEC should monitor the dynamics of the bioeconomy and circular economy to identify the current and future competences needed in the sector**”, it can be seen that most of the participants agree (52,1%) and strongly agree (30,5%) in the statement. In the scale of 5, the mean of this answer is 4,09 (SD: 0,79), the mode is 4 and the median is 4.

The analysis of the mean in the considered European Areas (next figure) shows that there are some differences between the areas. The lower mean is 3,9 and it appears in Central Europe (SD: 0,9). The higher mean is in East Europe, with 4,4 (SD: 0,6) followed by Mediterranean Europe, where the mean is 4,1 (SD: 0,7) and North Europe, with a mean of 4,0 (SD: 1,1).

Figure 22: Means per European Area for “BBEC should monitor and identify the current and future competences needed in the sector”.



The analysis of the median and the mode is shown in the following table, where the median and mode is 4 in all the areas.

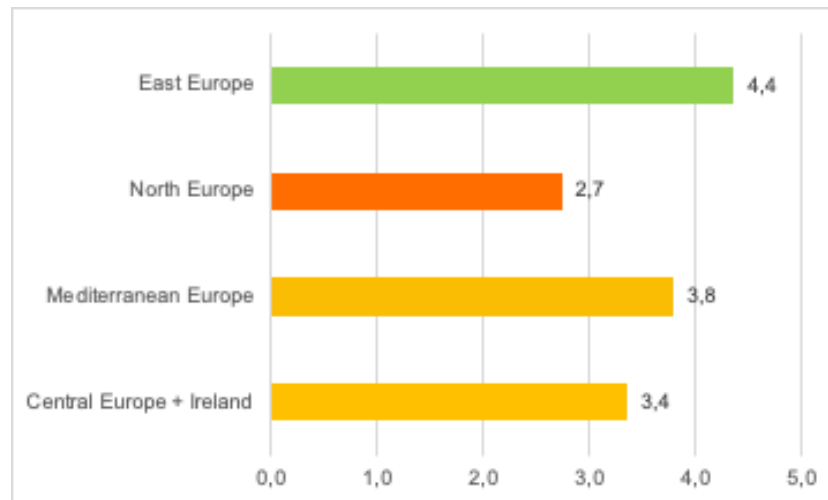
Table 19: Mode and median per Area for “BBEC should monitor and identify the current and future competences needed in the sector”.

Area	Median	Mode
Central Europe + Ireland	4,0	4,0
Mediterranean Europe	4,0	4,0
North Europe	4,0	4,0
East Europe	4,0	4,0

In the case of the statement 9 “**BBEC should certify providers of bioeconomy and circular economy training to ensure they are aligned with real industry needs**”, it can be seen that most of the participants agree (34,7%) and strongly agree (22,5%) in the statement. There is a high number of participants (31,5%) that neither agree nor disagree. In the scale of 5, the mean of this answer is 3,64 (SD: 1,04), the mode is 4 and the median is 4.

The analysis of the mean in the considered European Areas (next figure) shows that there are differences between the areas, since the lower mean is in North Europe, with 2,7 points (SD: 1,1) and the higher mean is in East Europe, with 4,4 (SD: 0,7). Mediterranean Europe mean is 3,8 (SD: 0,9) and Central Europe mean is 3,8 (SD: 1,1).

Figure 23: Means per European Area for “BBEC should certify providers of bioeconomy and circular economy”.



The analysis of the median and the mode is shown in the following table, where the median is 4 for in Mediterranean Europe and East Europe, and it’s 3 in Central Europe and North Europe. In the case of the mode, this is 3 in all the areas except in Mediterranean Europe, where it is 4.

Table 20: Mode and median per Area for “BBEC should certify providers of bioeconomy and circular economy”.

Area	Median	Mode
Central Europe + Ireland	3,0	3,0
Mediterranean Europe	4,0	4,0
North Europe	3,0	3,0
East Europe	4,0	5,0

For statement 10 “**BBEC should provide train-the-trainer activities to update the pedagogical competences of teachers, professors and trainers in the bioeconomy and circular economy**”, most of the participants strongly agree (50,7%) and agree (30,5%) in the statement. In the scale of 5, the mean of this answer is 4,05 (SD: 0,86), the mode is 4 and the median is 4.

The analysis of the mean in the considered European Areas (next figure) shows that there are differences between the areas. The lower mean is 3,4 and it appears in North Europe (SD: 1,3). The higher mean is in East Europe, with 4,5 (SD: 0,6) followed by Central Europe, where the mean is 4,1 (SD: 0,8) and Mediterranean Europe, with a mean of 4,0 (SD: 0,8).

Figure 24: Means per European Area for “BBEC should provide train-the-trainer activities to update the pedagogical competences”.



The analysis of the median and the mode is shown in the following table, where the median and mode is 4 in all the areas except for East Europe, where both indicators are 5.

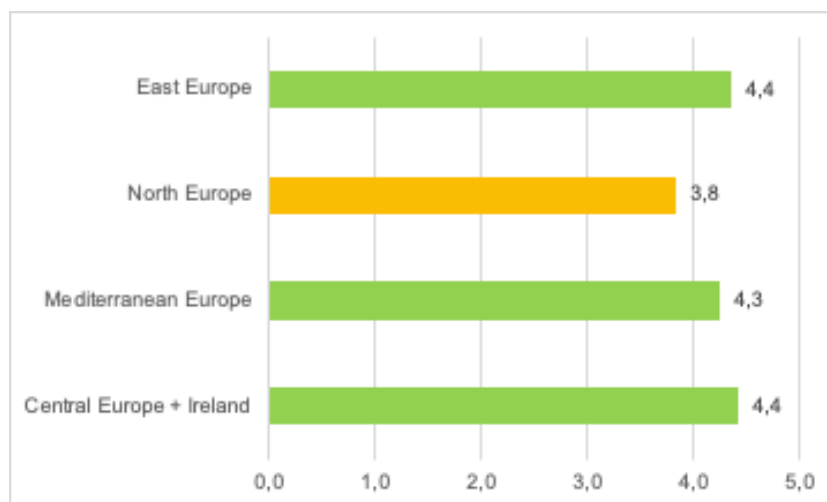
Table 21: Mode and median per Area for “BBEC should provide train-the-trainer activities to update the pedagogical competences”.

Area	Median	Mode
Central Europe + Ireland	4,0	4,0
Mediterranean Europe	4,0	4,0
North Europe	4,0	4,0
East Europe	5,0	5,0

For statement 11 “**BBEC should provide opportunities to teachers, professors and trainers to update their knowledge and competence regarding bioeconomy and circular economy**”, it can be seen that most of the participants agree (49,3%) and strongly agree (41,8%) in the statement. In the scale of 5, the mean of this answer is 4,29 (SD: 0,76), the mode is 4 and the median is 4.

The analysis of the mean in the considered European Areas (next figure) shows that there are some differences between the areas. The lower mean is 3,8 and it appears in North Europe (SD: 1,4). The higher mean is in East Europe and Central Europe, with 4,4 and an SD: 0,7 in both areas. Mediterranean Europe mean is 4,3 (SD: 0,6).

Figure 25: Means per European Area for “BBEC should provide opportunities to teachers, professors and trainers to update their knowledge”.



The analysis of the median and the mode is shown in the following table, where the median and mode is 4 in all the areas, except for Central Europe where both indicators are 5.

Table 22: Mode and median per Area for “BBEC should provide opportunities to teachers, professors and trainers to update their knowledge”.

Area	Median	Mode
Central Europe + Ireland	5,0	5,0
Mediterranean Europe	4,0	4,0
North Europe	4,0	4,0
East Europe	4,0	4,0

In the case of the statement 12 “**BBEC should have laboratories and other equipment to support R&D&I and the innovation-related activities of companies**”, most of the participants agree (31,9%) and strongly agree (20,2%) in the statement. However, there is a high number of participants that neither agree nor disagree (24,9%) and 16,9% of participants that disagree. In the scale of 5, the mean of this answer is 3,43 (SD: 1,17), the mode is 4 and the median is 4.

The analysis of the mean in the considered European Areas (next figure) shows that there are differences between the areas, since the lower mean is in North Europe, with 2,5 points (SD: 1,3) and the higher mean is in East Europe, with 3,8 (SD: 0,7). Mediterranean Europe mean is 3,6 (SD: 1,0) and Central Europe mean is 3,3 (SD: 1,3).

Figure 26: Means per European Area for “BBEC should have laboratories and other equipment to support R&D&I and the innovation-related activities of companies”.



The analysis of the median and the mode is shown in the following table, where the median is 4 for in Mediterranean Europe and East Europe, it's 3 in Central Europe and 2 in North Europe. In the case of the mode, it's 4 in all the areas except North Europe, where it's 2.

Table 23: Mode and median per Area for “BBEC should have laboratories and other equipment to support R&D&I and the innovation-related activities of companies”.

Area	Median	Mode
Central Europe + Ireland	3,0	4,0
Mediterranean Europe	4,0	4,0
North Europe	2,0	2,0
East Europe	4,0	4,0

Finally, for statement 13 “**BBEC should help companies in opening their doors to international cooperation**”, most of the participants agree (52,6%) and strongly agree (23,9%) in the statement. In the scale of 5, the mean of this answer is 3,91 (SD: 0,89), the mode is 4 and the median is 4.

The analysis of the mean in the considered European Areas (next figure) shows that there are some differences between the areas, since the lower mean is in Mediterranean Europe and Central Europe with 3,8 points with a SD of 0,8 and 1,1 respectively. In East Europe and North Europe, the mean is 4,2, with a SD of 0,6 and 0,9 respectively.

Figure 27: Means per European Area for “BBEC should help companies in opening their doors to international cooperation”.



The analysis of the median and the mode is shown in the following table, where the median and mode is 4 in all the cases.

Table 24: Mode and median per Area for “BBEC should help companies in opening their doors to international cooperation”.

Area	Median	Mode
Central Europe + Ireland	4,0	4,0
Mediterranean Europe	4,0	4,0
North Europe	4,0	4,0
East Europe	4,0	4,0

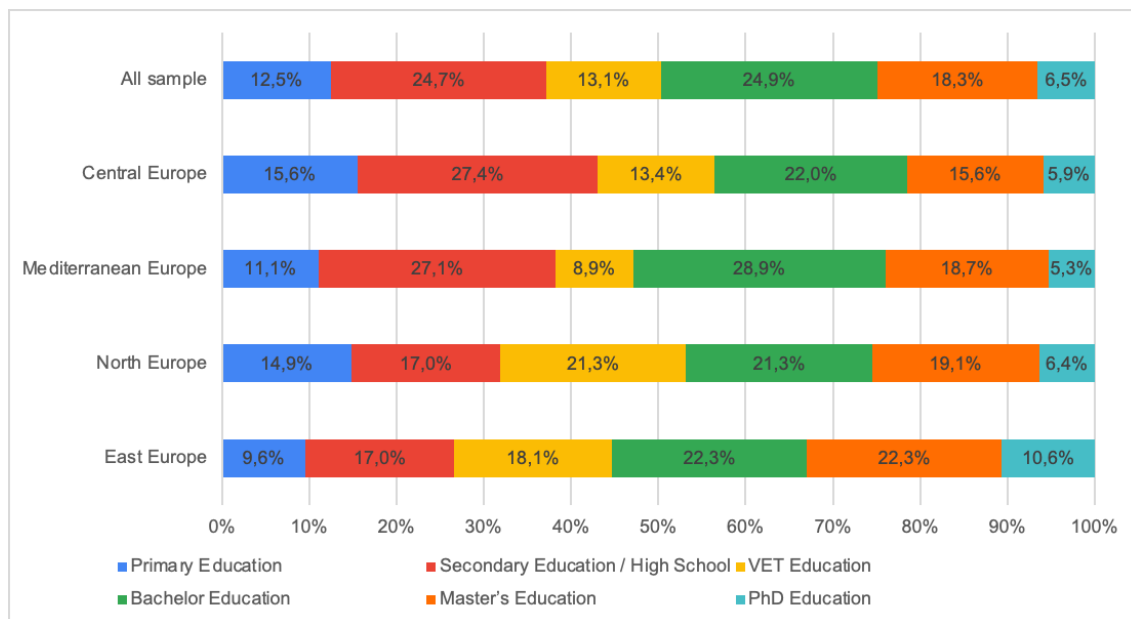
4.2.3. Educational levels where bioeconomy and circular economy education should be improved

The survey also asked the participants about which levels of the educational system should be involved in the BBEC. They were able to choose up to three options in a list of 6 options (primary education, secondary education, VET education, Bachelor’s education, Master Education and PhD Education). The answers are represented in the following figure. From the survey participants’ perspective, the institutions that should be mostly involved in the BBEC centres are the Universities and educational institutions linked to primary and secondary education. It is important to highlight that it’s only in the case of East Europe where 10’6% of the participants consider that PhD

Education should be involved in the BBEC, while the whole sample mean is 6,5%, and in the other regions this level of education is under 6,5% in all the cases.

There is a similar trend in the VET Education, in Central Europe and Mediterranean Europe is the second lowest educational level selected by the survey participants. However, in the case of North Europe (21,3%) the involvement of this educational level is higher than in East Europe (18,1%).

Figure 28: Summary of the educational levels where bioeconomy and circular economy should be improved across European areas and for all regions.



In the case of Centre Europe, the involvement of primary education and secondary education is selected in more than 40% of the cases, while in the Mediterranean Europe and North Europe is selected between 30% and 40% of the cases. East Europe is the region where these educational levels involvement is less selected by the participants, since only 26,6% of them selected it.

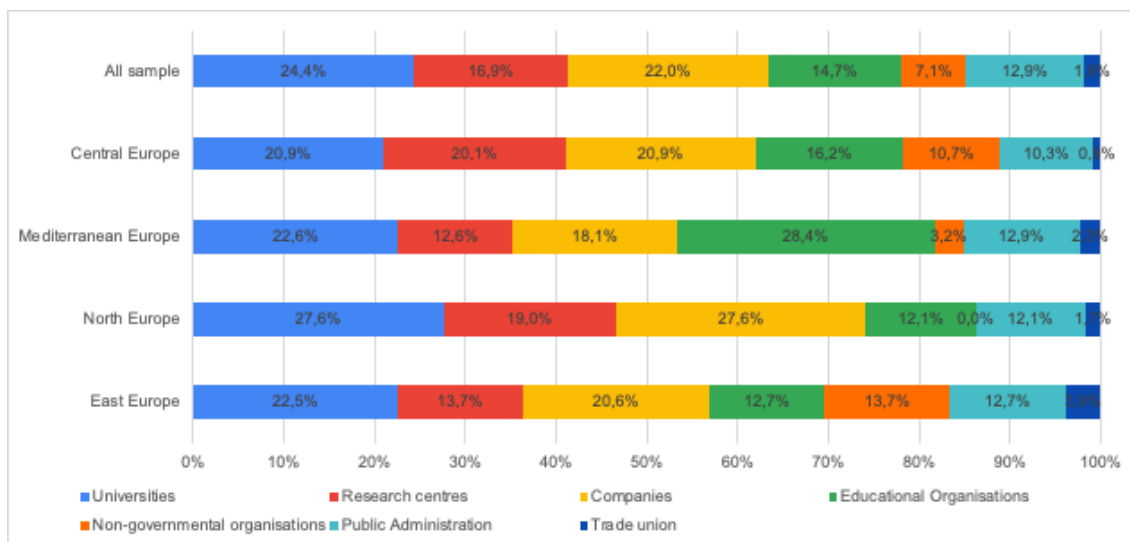
Focusing on higher education, participants selected mostly the involvement of Bachelor Education, always in a percentage between 21,3%, in the case of North Europe and 28,9% in the case of Mediterranean Europe. In the case of the involvement of Master Education, the region where it's more selected is East Europe (22,3%), while in the other regions the percentage of preference is between 15,6% (Central Europe) and 19,1% (North Europe).

4.2.4. Main stakeholders to be involved in BBECs

Survey participants were asked to identify up to three types of stakeholders that should be involved in the BBECs, in a list of 7 options (Universities, Research Centres, Companies, Educational Organisations, Non-governmental Organizations, Public Administrations and Trade Unions).

As it is represented in the following figure, the stakeholders less selected by the participants in the survey are Trade Unions, followed by Non-governmental Organizations. The most selected stakeholders are universities (24,4%), followed by Companies (22%) and Research Centres (16,9%).

Figure 29: Summary of the main stakeholders to be involved in BBECs across European areas and for all regions.



In the case of Central Europe, participants selected equally, with 20,9% in the cases, universities, and companies, followed by research centres which were selected in 20,1% of the cases. The next stakeholders to be involved selected in by participants were Educational Organisations (16,2%), Non-governmental Organizations (10,7%) and Public Administrations (10,3%).

In the Mediterranean Europe area, the stakeholder more selected by the participants were Educational Organisations, followed by universities (22,6%), Companies (18,1%), Public Administrations (12,9%) and Research Centres (12,6%).

If we focus on the area of North Europe, we see that the stakeholders more selected by the participants are Universities and Companies, both in 27,6% of the cases. These are followed by Research Centres (19%), and Educational Organisations and Public Administrations, both selected in 12,1% of the cases.



In the case of East Europe, the most selected stakeholders to be involved in the BBEC were Universities (22,5%), followed by Companies (20,6%), Non-Governmental Organisations (13,7%) and Research Centres and Public Administrations (12,7%).



This project has received funding from the Bio-based Industries Joint Undertaking (JU) under the European Union's Horizon 2020 research and innovation programme under grant agreement No 101023381. The JU receives support from the European Union's Horizon 2020 research and innovation programme and the Bio-based Industries Consortium.

4.5. Desk research

The main objective of desk research was to get information about different documents, related to previous projects, national reports, international reports, bibliography, etc. that have already implemented research related to the objectives of BIObec. All the project partners participated providing data of previous project through the following template:

Identification of the project Title / Website / Main Objective
Link to documents, if its available online If not, upload on TEAMS / WP1 / T1.2-Desk_Research. Specify the name of the file below
Brief summary of the project <i>(Objectives, context, methodology, main results) – The most important are the main results</i>
Identify which are the <u>main conclusions of the project</u> that related to BBECs needs, opportunities and expectations.

With the desk research we identified 26 projects. Our aim was not to list all the previous projects implemented, but those whose results should be directly related to BIObec. Some of the results listed in the following pages have been already considered in the preparation of the project, as well as during the preparation of some of the activities already implemented. Next table summarizes the projects analysed.

Table 25: Summary of projects analysed through desk research methodology.

Project Name	More information
UrBIOfuture - Boosting future careers, education and research activities in the European bio-based industry	https://www.urbiofuture.eu/
Bio4Africa	https://www.bio4africa.eu/
Rural RDI milieus in transition towards smart bioeconomy clusters and innovation ecosystems	https://bit.ly/3j3aVlf
Bloom – Boosting European Citizen’s Knowledge and Awareness of Bio-Economy Research and Innovation	https://bloom-bioeconomy.eu
BIOBENS – pH sensitive biocompatible bandages	https://publications.cnr.it/doc/464087
Coopid - COOPeration of bioeconomy clusters for bio-based knowledge transfer via Innovative Dissemination techniques in the primary production sector	https://interactiveplatform.coopid.eu/
NextFOOD - Educating the next generation of professionals in the agrifood system	https://www.nextfood-project.eu/
BioeconomyVentures- Raising disruptive ventures, start-ups and spin-offs to the top	https://www.bioeconomyventures.eu/

MpowerBIO empowers Clusters to bring SMEs across the financial valley of death	https://mpowerbio.eu/
AGRI-entrepreneurship and EcoInnovation - AgriEco	https://agrieco.eu/
SMecoMP - Knowledge Alliance in Eco-Innovation Entrepreneurship to Boost SMEs Competitiveness	https://www.smecomp.eu/
Business e-incubator go-up	https://www.goupincubator.com/
Digitization of Higher Education for Renewable Energy Systems in Europe	Not available yet
BoostEdu – Boosting relevant and applicable continuing education in the food sector	https://boostedu.eu/
RM@Schools - Raw Matters Ambassadors at Schools	http://rmschools.eu/
BIOvoices	https://www.biovoices.eu/
LIFT – Boosting Bioeconomy by maximising CSAs results	https://www.lift-bbi.eu/
European Bioeconomy Network	https://eubionet.eu/
BioBridges project for sustainable Bioeconomy	https://www.biobridges-project.eu/
Integrated Qualifications System,	https://kwalifikacje.gov.pl/en/
The European green good – assessment of knowledge and attitudes	https://lewiatan.org/
Transition2BIO – Support the TRANSITION towards the BIOeconomy for a more sustainable future through communication, education and public engagement	https://www.transition2bio.eu/
ABBEE - Accelerating the transition towards the Bio-Based Economy via Education	https://abee.eu/
European Bioeconomy University	https://european-bioeconomy-university.eu/education/ebu-label/
BIOEAST – Central-Eastern European Initiative for Knowledge-based Agriculture, aquaculture and Forestry in the Bioeconomy	http://www.bioeast.eu
BIO-ERKO	https://www.biotalouskoulutusitasuomi.fi/en/

Identification of the project

<https://www.urbiofuture.eu/>

UrBIOfuture - Boosting future careers, education and research activities in the European bio-based industry (Ref. 837811 - H2020-BBI-JTI-2018)

Link to documents, if its available online

Documents about the project results are available here:

<https://ddd.uab.cat/search?f=keyword&p=UrBIOfuture&sc=1&ln=ca>

Brief summary of the project

The project aimed to bring Europe to the forefront of the Bio sector by identifying the educational needs and gaps in the European Bio sector, identifying career opportunities in research and involving all interested parties in a co-creation process that offers the "UrBIOFuture" experience as a fundamental tool to attract talent and provide professional guidance.

Given the European strategy of positioning Europe as a world leader in the Bio sector, the objectives proposed by the UrBIOfuture project aimed at: (1) mapping the current educational programs that develop their curriculum focused on the Bio industrial sector; (2) achieve alignment between educational and research institutions and the industrial sector; and (3) Identify the gaps between the training offer and the real needs of professionals and companies in the sector; and (4) propose a tool to promote vocations in the Bio sector, in what is going to be called "UrBIOfuture Experience".

To achieve the main objective of the project, a complete analysis of the current educational offer was carried out (with the programs in progress and the complete ones). In parallel, the main publics of the industry and the Bio sector were involved in order to carry out a consultation to identify opportunities and gaps for the promotion of the bearer.

In this way, the parties involved participated jointly in the creation of the so called "UrBIOFuture experience"; a toolkit with a collection of materials and actions that will make it possible to align education and research to provide trained people to build a sustainable biological industry in Europe.

Identify which are the main conclusions of the project that related to BBECs needs, opportunities and expectations.

The UrBIOfuture project addressed the need to identify the skills gaps in the framework of biobased industries and how these can be filled. In the framework of the project the following activities were completed:

- Map of the completed and ongoing programmes addressing curricula that involve biobased activities.



- Foster the interaction and alignment among educational and research institutions and industry.
- Identify current education and professional gaps and skills mismatch in the biobased field.
- Design of booklets to spread the importance of biobased careers among students, unemployed people and professionals.
- Identification of best practices in academy-industry cooperation.

Identification of the project

Bio4Africa, <https://www.bio4africa.eu/>

The project runs from 2021-2025, so recently started

Main objective is to empower smallholder farmers to generate new sources of income by creating value from locally available biomasses

Link to documents, if its available online

Catalogue of technologies <https://www.bio4africa.eu/technologies/>

The project has not many results yet.

Brief summary of the project

Our focus is on transferring simple, small-scale, and robust bio-based techs adapted to local biomass, needs and contexts, including green biorefinery, pyrolysis, hydrothermal carbonisation, briquetting, pelletising, bio-composites, and bioplastics production
BIO4Africa has set up four pilot cases with eight testing sites in Uganda, Ghana, Senegal and Cote d'Ivoire, offering more than 300 farmers and farmer groups, including small dairies and lower-income farmers, women farmer groups and transhumant pastoralists, the opportunity to test them in real productive conditions.

Identify which are the main conclusions of the project that related to BBECs needs, opportunities and expectations.

No main conclusions yet, but BBECs could become localities to train advisors and businesses to transfer technologies between continents

Identification of the project

“Rural RDI milieus in transition towards smart bioeconomy clusters and innovation ecosystems”
<https://www.jamk.fi/en/project/rdi2club-and-connectedbybiobord/about-the-rdi2club-and-biobord-projects>

Bioeconomy means economic activities that utilize the biological natural resources and turn them into food, energy, and other products and services providing jobs and business opportunities. The rural areas of Baltic Sea region have a great potential for bioeconomy as they have abundant natural resources. However, these regions struggle to reach their full potential due to limited human capital, business networks and clusters. So far, the small and medium-size enterprises (SMEs) in bioeconomy are mostly in traditional, resource-based industries that have not taken full advantage of latest technology and service innovations.

Link to documents, if its available online

Joint Action Plans of the RDI2CluB project partnership (Full report) -

<https://www.jamk.fi/media/34517>

Regional Action Plan, Central Finland - <https://www.jamk.fi/media/34520>

Regional Action Plan, Świętokrzyskie Voivodeship, Poland - <https://www.jamk.fi/media/34519>

Regional Action Plan, Vidzeme Planning Region, Latvia - <https://www.jamk.fi/media/34521>

Regional Action Plan, Estonia - <https://www.jamk.fi/media/34522>

Regional Action Plan, Inland Region Norway (transl. with RDI2CluB support) -

<https://www.jamk.fi/media/34523>

Brief summary of the project

RDI2CluB –project (Rural RDI milieus in transition towards smart bioeconomy clusters and innovation ecosystems), was part of the Interreg Baltic Sea region project family of 2014-2020 under the Priority 1 'Capacity for innovation' that was dedicated to actions strengthening the ability of the Baltic Sea region to create and commercialize innovation.

RDI2CluB united authorities, RDI institutes (research, development, and innovation institutes) and business development bodies from five regions to a joint quest of boosting smart and sustainable bioeconomy development in the rural areas of Baltic Sea region. The five regions of the RDI2CluB partnership were:

- Central Finland/Finland
- Inland/Norway
- Świętokrzyskie Voivodeship/Poland
- Vidzeme/Latvia
- Estonia

At the core of RDI2CluB was a transnational learning process that resulted in Regional Bioeconomy Profiles, and Joint Action Plan for developing innovation capacity and enhancing smart specialization. Thereafter, the partner regions built a model for transnational innovation



co-operation, called Biobord Operating Model, and a digital platform, Biobord, that functions as a meeting place and innovation arena for bioeconomy developers. Finally, piloting with the SMEs provided feedback on the smart specialization potential in bioeconomy as well as helps to validate the usability and functionality of the transnational innovation model and to scale up the digital platform. A long-term network agreement between RDI2CluB partners was formed on the basis of the Joint Action Plan and the model for transnational innovation co-operation enabled by the Biobord platform.

Identify which are the main conclusions of the project that related to BBECs needs, opportunities and expectations.

<https://biobord.eu/>

Biobord is an online platform for bioeconomy developers. Biobord welcomes all who are interested in networking, finding people with shared interests, and sharing knowledge and ideas on the development of sustainable bioeconomy business.

Biobord is a place for:

- Sharing knowledge and learning from each other
- Networking to build partnerships and to connect with experts
- Finding support for developing your idea
- Interactive discussion with your stakeholders
- Co-working on joint projects with all information in one place – no email flood
- Communication channel for an audience of bioeconomy developers around the Baltic Sea

Identification of the project

BLOOM <https://bloom-bioeconomy.eu/objectives-and-approach/>

1. Raise awareness and enhance knowledge on bioeconomy
2. Reduce the fragmentation of awareness strategies and build up a bioeconomy community
3. Gain common understanding
4. Foster (social) learning and education

Five regional hubs are being established to foster public engagement in the bioeconomy and to create a space of exchange and debate. The hubs are focusing on different areas important to the regions. They will enlarge their regional networks with Civil Society Organisations and engage young European citizens, science communication networks, NGOs, media and – crucially – the general public, through a series of co-creation workshops and outreach activities. Additionally, schools in then different European countries are specifically involved and working on how to integrate bioeconomy into the diverse European school systems.

Link to documents, if its available online

<https://bloom-bioeconomy.eu/workpackages/>

In every WP there are links to the developed documents.

Brief summary of the project

BLOOM is an EU Coordination and Support Action implemented from 2017 to 2020. The project aims at bringing together partners from across Europe to debate, communicate, and engage the public in the potential of bioeconomy. An economy based on biomass promises to foster a circular economy and to enhance climate change mitigation, while reducing dependence on fossil fuels.

Bioeconomy covers a broad range of sectors, from agriculture and the agri-food industry, to fisheries, forestry, biorefineries, chemistry and (bio) energy – but despite its many applications, it has yet to enter into the public consciousness as an exciting solution to societal challenges.

Identify which are the main conclusions of the project that related to BBECs needs, opportunities and expectations.

Anchor points in the BLOOM project are five BLOOM hubs in different regions in Europe that form communities of practice. They are led by consortium partners who invite and involve network partners, such as regional triple helix partners and other bioeconomy stakeholders. Together, they build working teams that develop in co-creation workshops outreach activities and materials to strengthen increased public engagement in bioeconomy.

<https://bloom-bioeconomy.eu/hubs/>

In the BLOOM project, 20 pilot teachers representing schools from Greece, Austria, Spain, Sweden, Poland, Italy, Belgium, Portugal, Israel, Croatia (two teachers per country) who teach physics, biology, mathematics, engineering, technology or chemistry, have been selected in



order to produce new bio economy teaching resources, test these resources in their schools/classrooms and provide feedback on their implementation.

Additionally, these teachers will also encourage, train and support other teachers and schools to use the project resources, and disseminate the project, resources and other bio economy opportunities in their region. Finally, they will support and contribute to the development of a MOOC on bio economy and its applications in teaching, for primary and secondary school teachers.

<https://bloom-bioeconomy.eu/schoolnetwork/>



This project has received funding from the Bio-based Industries Joint Undertaking (JU) under the European Union's Horizon 2020 research and innovation programme under grant agreement No 101023381. The JU receives support from the European Union's Horizon 2020 research and innovation programme and the Bio-based Industries Consortium.

Identification of the project

BIOBENS – pH sensitive biocompatible bandages
 Developing biocompatible bandages with bio-based/natural pH sensitive dyes

Link to documents, if its available online

<https://publications.cnr.it/doc/464087>

Brief summary of the project

Preparation of fabrics with halochromic properties (i.e., pH sensing) for biomedical uses. The peculiarity of halochromic dyes is that of varying colour as the pH of the environment with which they are in contact varies. It was shown in a previous study that dyes with these properties are able to maintain them even when applied to a textile substrate. This particular feature can be exploited in various fields, including the biomedical one. It is in fact known that the pH of an intact and healthy skin takes on characteristic values of about 5 - 5.5 while in the case of an inflammatory state the pH of the skin can reach 8. The aim of the project was to prepare fabrics dyed with natural pH-sensitive dyes for a possible application in monitoring the healing processes of inflamed skin.

Identify which are the main conclusions of the project that related to BBECs needs, opportunities and expectations.

Some pH-sensitive natural dyes, such as curcumin, are able to change colour in the range required for biomedical applications. Stabilities to washing and sweat are good for cotton. Other natural dyes, such as E120 and E163, are able to dye wool and polyamides; they can change colour at acidic condition. The dyes were biocompatible by in-vitro tests.

Further works can be done to investigate more dyes for the applications. Based on these results, pH-sensitive natural dyes can be included as a BBEC topic.

Identification of the project

Coopid project (COOPERation of bioeconomy clusters for bio-based knowledge transfer via Innovative Dissemination techniques in the primary production sector)

The general objective of the project is to mobilise EU primary producers to stimulate the wide uptake of inclusive and sustainable bio-based business models in the European primary production sector & increase its competitiveness. [Coopid project web site](#)

Link to documents, if its available online

Interactive platform coopid

In the online platform, you will find examples of successful networks and businesses across the EU agri-food sector, contacts, forums, surveys, self-assessment tools, and media resources. The platform is part of the COOPID H2020 project.

Brief summary of the project

Bioeconomy starts on the fields, yet meaningful participation of the primary sector in the bioeconomy is currently challenged, especially due to:
 (i) poor cooperation and knowledge transfer between relevant stakeholders,
 (ii) limited support to invest in R&D of new value chains.

To answer this challenge, the COOPID project proposes an effective strategy to mobilise primary producers and stimulate the uptake of inclusive and sustainable bio-based business models in the European primary production sector, considering regional & sectorial conditions.

To do so, a network of COOPID Bioeconomy Clusters from 10 European countries has been created ad-hoc, involving a range of stakeholders: (a) primary producers, in cooperatives or associations, within agriculture, forestry & aquaculture, (b) industry, (c) public sector, (d) research & academia.

Identify which are the main conclusions of the project that related to BBECs needs, opportunities and expectations.

The project is still in progress. The main focus is the mobilisation of female and young producers as having a great potential to innovate yet being underrepresented in the primary production sector. Moreover, recommendations for primary producers, policymakers and academia & research will be elaborated, fostering better understanding of different perspectives on bioeconomy, having a significant impact on a wide bioeconomy deployment in primary production, reaching a broad audience (estimated at 9,500 stakeholders). The expected impact of the coopid has also a role in reaching the objective of BBECs related to the deployment of bioeconomy initiatives in Europe.

Identification of the project

NextFOOD - Educating the next generation of professionals in the agri-food system

<https://www.nextfood-project.eu/>

Enhancing the co-creation of innovation and knowledge in agriculture, forestry and related bio-value chains. Developing an innovative European science and education roadmap for sustainable agriculture. Inducing a paradigm shift from a linear to a cyclical approach of learning.

Link to documents, if its available online

<https://www.nextfood-project.eu/deliverables/>

<https://www.nextfood-project.eu/nextfood-platform/> (recommended)

Brief summary of the project

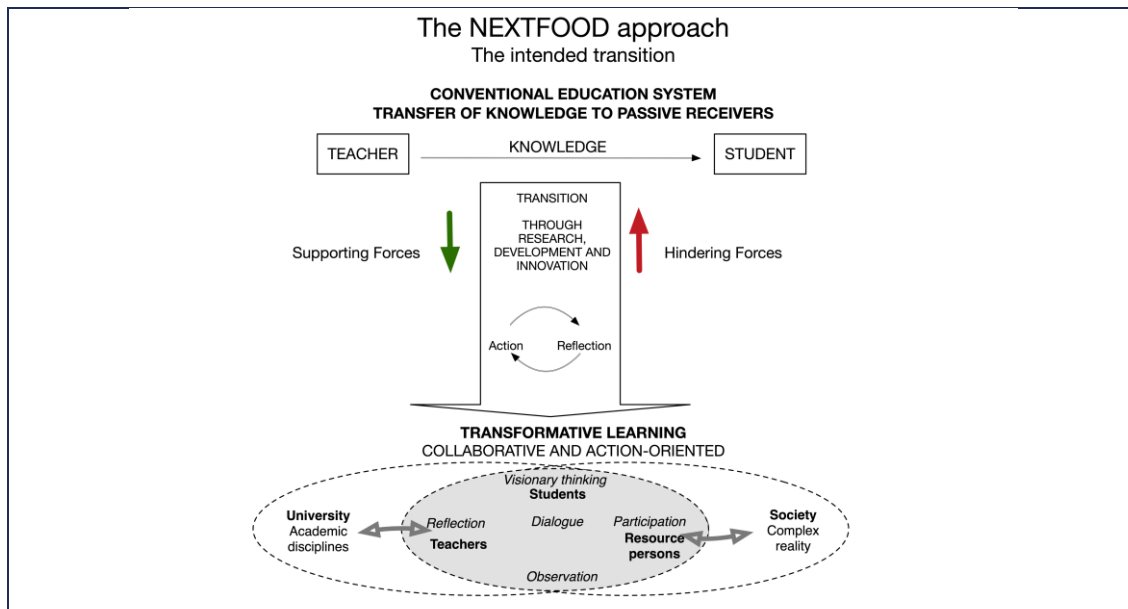
The H2020 Project NextFOOD aims to educate the next generation of professionals in the Agri-Food and Forestry Sectors with skills and competencies to push the green shift in our rapidly changing society.

The NextFOOD project explores the Agri-Food and Forestry Education and Training both inside and outside the EU, in order to finalize a better comprehension of the complexity of our Educational Systems.

Indeed, the core of the project was developed in several pioneering case studies (12 Case Studies, in 13 Countries, in 3 Continents), challenging teachers and students with problems related to sustainability. The novelty of the project is represented by the collaboration among researchers, teachers, students and other relevant stakeholders to solve the challenges while developing both sustainability-oriented technical skills and soft collaborative competencies.

The main results that can be valuable for BBECs are:

- The “Inventory of skills” in WP1 that explores the needed skills and competencies to support a development, towards more sustainable agriculture, forestry and associated bio-value chains (D1.1).
- The NextFOOD approach (namely, action learning) described in D3.1 and in the image below. This pedagogical approach seeks to shift from theoretical knowledge alone to the competences that are needed to support sustainable development through action and reflection. Indeed, a set of five core competences have been identified as crucial to enable collaboration, learning and development in the dialogue space: Observation, Reflection, Participation, Visionary Thinking and Dialogue.



- The “Report on new instruments design and implementation options” (D4.4 – still not available, but headed by Unibo team), that offers a collection of policy tools to respond to specific policy objectives found in the previous Deliverables (D4.1, D4.2, D4.3). The policy tools address policymakers that take part in the policy contexts of Education and Training of the Agri-Food and Forestry sectors, as well as other main actors that take role in and contribute to the process. These policy instruments were proposed, targeting four different levels of the ET systems: 1 – Pre-University, 2 – University, 3 – Vocational education and training (VET), and 4 – Lifelong learning (LLL). Besides, some Overarching policy objectives were also evaluated, which meant that some overarching topics that are relevant and significant across all levels of the ET system were brought together.

Identify which are the main conclusions of the project that related to BBECs needs, opportunities and expectations.

The project is close to the end. The main conclusion can be synthesized in:

- The Agri-Food and Forestry System requires: New multidisciplinary and interdisciplinary skills (e.g., teamwork, collaborations skills, entrepreneurship, etc.); Practical competencies; sustainability-based approaches both to solve problems and to teach (new sustainable pedagogy).
- The opportunity for BBECs is to accompany these new approaches (action learning and transformative approaches) together with traditional teaching methods.
- The “Report on new instruments design and implementation options” helps to outline the policy objectives, policy tools, main actors and related best practices with regard to the educational training policies in the AFF sectors, under different levels (namely, Overarching issues, Pre-University, University, VET and LLL).



The policy tools can be valuable for BBECs for two main reasons:

- First, they represent a guideline for the governance and management of Education and Training, helping, potentially, the BBECs in defining their own rules and governance structures.
- Second, the policy tools are designed with a systemic approach, thinking to all the actors involved in Education and Training, in order to make a change of pace for the whole sector or, at least, for the whole educational level (Pre-University, University, VET and LLL).

Identification of the project

BioeconomyVentures- Raising disruptive ventures, start-ups and spin-offs to the top.

<https://www.bioeconomyventures.eu/>

BioeconomyVentures aims to build the reference platform for bioeconomy-based start-ups and spin-offs seeking to gain access to finance, becoming the main meeting point in the European bioeconomy.

Link to documents, if its available online

The BioeconomyVentures platform will soon be released.

(<https://platform.bioeconomyventures.eu/>)

Brief summary of the project

Objectives:

- Scope for and recruit >200 entrepreneurs with the goal of exploring and quantifying their needs in the bio-based sector for specific financial and business advice towards boosting product development and access to market/finance.
- Incentivize the investment community in engaging with the bio-based industry and to secure one-on-one meetings with expert companies, organisation, ventures and other private/public investment funds for 200 Entrepreneurs, Start-ups/SMEs and target >30 deals at BioeconomyVentures promoted events and beyond.
- Design, develop and execute an interactive platform that will serve as a main meeting point for the bioeconomy entrepreneurship field, bringing together relevant groups of stakeholders and integrating, on one single access point, high quality services aiming to unlock the innovation potential and uncover opportunities to build relationships/partnerships across the BioeconomyVentures network.

Main Results:

The project is currently ongoing. 20 cluster organisations have signed up to become BioeconomyVentures ambassadors. These ambassadors will organise 46 Explore & Expand workshops which will have SMEs pitching to investors throughout Europe. The BioeconomyVentures platform will soon be launched. The project is also launching open call for corporate challenges and open call for innovators.

Identify which are the main conclusions of the project that related to BBECs needs, opportunities and expectations.



BioeconomyVentures is in the process of developing a sustainable One-stop-shop-platform, the Bioeconomy Ventures Platform that will serve as the main meeting point for start-ups, spin-offs, investors and corporates working in this emerging field. It will serve as the central node for communication, collaboration and business skills building within the bioeconomy entrepreneurship field. The Platform will eliminate main hurdles bioeconomy start-ups are facing in terms of networking, access to finance and business skills.

This style of platform may be used for BBEC to provide a matchmaking platform for students, third-level institutions, employees and employers to network. This will align the needs for skills and availability of skills through interactions on the platform.

Using this style of platform:

- Students can post experience gained and search for skills required for future careers.
- College staff will get a better understanding of what is needed from their college graduates in the workplace.
- Employers can post job opportunities and current skill gaps in the market.
- Current employees can search for other job opportunities in the bioeconomy and skills needed for promotion in current role.

Identification of the project

MPOWERBIO- eM-POWERing SME Clusters to help SMEs overcome the valley of death.

<https://mpowerbio.eu/>

MPOWERBIO is aimed at setting up and implementing a training webinars for clusters and for their SMEs, empowering clusters to raise awareness and improve the investment readiness and pitching skills of their SMEs as well as building links with investors and directly connecting investment ready SMEs identified and supported at regional competitions with expert coaches, investors and business partners at a final event, where the regionally selected projects will pitch their investment and partnering opportunities in front of investors and potential partners

Link to documents, if its available online

<https://courses.mpowerbio.eu/>

Brief summary of the project

Objectives:

- Create a Capacity Building Programme to train Clusters to empower SME clusters to create awareness about available investment sources.
- Create a Business Support Programme which will be used within MPOWERBIO to train the SMEs, improve their business skills, and prepare them for fundraising.
- Engage clusters and SMEs to join the Capacity Building Program and Business Support Programme.
- Setup and organise two final pitching events, during which the best regionally selected SMEs and projects will connect with and pitch to active investors and potential business partners.

Main results:

The project is finished in October 2022. By this time, it is expected that MPOWERBIO will empower 90 clusters within the bio-based industry across Europe to be better equipped to help SMEs overcome the challenge of finding sufficient investment to get from idea to business. It is expected that by developing training webinars the project will get 250 SMEs one step closer to capturing investment. Throughout the project 10 regional events will occur to identify and select the most investor ready projects that will have access to one of the 2 final pitching events.





Identify which are the main conclusions of the project that related to BBECs needs, opportunities and expectations.

The project offers train the trainer events to ensure that clusters become self-supporting in this respect on completion of the project, with the ability to maintain these skills within their own organisations. For this, a “Skills Gap and Training Needs Analysis” occurred which involved capturing a European perspective through a broader survey to provide the consortium with a starting point which was be built on. The results of the survey provided a skill gaps analysis to identify deficit pattern. The data collected was imported to a matrix plotting clusters against the identified critical skills, to assess their particular training needs. This was used in the creation of the capacity building program (<https://www.youtube.com/watch?v=nENpuaVg-nU>).

Identification of the project

Strategic partnership for AGRI-entrepreneurship and EcoInnovation - AgriEco Agreement n°2019-1-BG01-KA203-062284; KA 203/HE-26/17-09-2019 ERASMUS+ PROGRAMME, Key Action 2: Cooperation for innovation and the exchange of good practices, Strategic partnerships in the field of education, training and youth

<https://agrieco.eu/>

Link to documents, if its available online

<https://agrieco.eu/>
2019-2022

Brief summary of the project

AgriEco creates synergies from complementary knowledge, skills and resources, and generates a unique value in providing real solutions and tangible responses to support HE students in the field of agricultural entrepreneurship. The project is not an alternative to the formal educational system, but rather a steppingstone to smoothing the transition from university to work, including improved portfolio offering a tailor-made advanced training; acquisition of new competencies and experience; new training models and development of news disciplines; and change (in different degrees but still) of the attitude towards the connection “education2business”.

Identify which are the main conclusions of the project that related to BBECs needs, opportunities and expectations.

Specific objectives

SO1: Better integration of the education within the European research community

SO2: Upgrading learning and training capacity and capability

SO3: Improved educational capacity for regional economic and social development

How?

1. Offer accessible and flexible intensive training programme, coupled with blended mobility exchanges – theoretical and practical - for higher education students/ PhD students/ postdocs, to contribute to their chosen field of work, leading to real professional realization and job outcomes.
2. Encourage business and non-governmental sectors to cooperate with higher education systems and establish efficient partnership to maintain balance between business needs and academic processes and to promote youth professional realization on the market.
3. Establish efficient relationships with stakeholders and increase strategic partnerships that support professional pathways of the young people in academia e.g., mentor support and business coaching that shall ensure sustainability of project achievements.

Identification of the project

A knowledge Alliance in Eco-Innovation Entrepreneurship to Boost SMEs Competitiveness SMecoMP

Transnational Cooperation Programme Interreg Balkan-Mediterranean 2014-2020

<https://www.smecomp.eu/>

Link to documents, if its available online

<https://www.smecomp.eu/>

2014-2021

Brief summary of the project

The SMecoMP project concerns the development of an educational framework and appropriate training tools to improve the skills of business executives in Eco-Innovation Entrepreneurship. The consortium of the SMecoMP project is made up of organizations from four Balkan countries [Greece (University of Macedonia, Federation of Industries of Greece), Cyprus (Cyprus University of Technology, Cypriot Enterprise Link), Bulgaria (Bulgarian Industrial Association, Trakia University) and North Macedonia (St. Clement of Ohrid University of Bitola, Agency for Promotion of the Entrepreneurship of the Republic of North Macedonia)] and seeks to achieve cross-border co-operation between businesses and universities in order to promote and raise awareness of environmental innovation and entrepreneurship.

Identify which are the main conclusions of the project that related to BBECs needs, opportunities and expectations.

Within the scope of the project the following activities are implemented:

- compilation of a report assessing the existing knowledge, skills and requirements of SMEs related to eco-entrepreneurship, eco-management and eco-innovation
- review the current training material available, and develop new educational training processes based on SME needs
- develop an innovative learning framework in order to support education modernization and SME staff lifelong learning
- develop a learning-outcomes-based curricula based on SME professionals' cognitive and training needs
- develop and deliver tailor-made training modules adapted to eco-innovation entrepreneurial knowledge and skills required by SME staff
- increase professionals and SMEs' awareness on eco-innovation and sustainable economy practices
- establish an active transnational network of academics, vocational trainers, researchers, mentors, professionals, spin-offs to foster the integration of education, research and business
- provide a self-sustaining implementation strategy to support the recognition and transfer of the SMecoMP approach outside the Balkan Med area.

Identification of the project

BUSINESS E-INCUBATOR GO-UP

<https://www.goupincubator.com/>

Link to documents, if its available online

<https://www.goupincubator.com/>

2021 – no deadline

Brief summary of the project

BUSINESS E-INCUBATOR GO-UP is established thanks to the joint collaboration of the Horizon Results Booster of the European Commission.

We are aiming to accelerate smart growth in Europe-wide by facilitating start-up companies, cooperatives, social entrepreneurship, impact investment, youth agri-preneurship and venture-building across the whole agri-food value chain; creating smart, green jobs and intelligent employment opportunities for youth; and improving the regional framework of MSMEs development through the support and networking of local and regional partners in the public, private, civil-society and academic sectors.

Identify which are the main conclusions of the project that related to BBECs needs, opportunities and expectations.

We offer targeted support and services related to:

- Capacity enhancement: training, consulting, mentoring and other services to SMEs/ start-up and entrepreneurs in accordance with clearly defined skills gaps.
- Job/ employment creation: facilitating start-up and competitiveness of the SMEs (incl. among students/ researchers) and promote innovation in the agri-sector with highest potential employment creation and growth.
- Cross-sectorial linkage development: fostering and strengthening academic - business cooperation.
- Venture building in agri-food and bioeconomy by pooling together resources, creating facilities for growing businesses from scratch to unicorns, innovating in products, services and value chains that are climate neutral, smart and socially fair.

Identification of the project

Digitization of Higher Education for Renewable Energy Systems in Europe HED-RES-EU Agreement n° 2021-1-BG01-KA220-HED-000032149 2021-2024

Link to documents, if its available online

Website in progress

Brief summary of the project

The overall aim of the " HED-RES-EU" project is to develop and transfer experimental and innovative teaching methods contributing to the quality of renewable energy education to fill the gap between the growing industry demand for specialized renewable energy expertise and the skills currently available on the job market. Since a global revolution in the energy sector is occurring with rapidly declining technology costs, many countries and countless subnational and local governments are committing to renewable and sustainable energy targets today. In the last decade, wind power capacity worldwide has grown by over 370%, annual biodiesel production has increased by 1100%, and solar photovoltaic capacity has grown by a staggering 6700%. Within the rapidly expanding EU renewable energy industry, an urgent demand exists for more graduate-post-graduate and trained staff specialized in renewable energy technology. On the other hand, education and training are not at a desirable level for energy technologies and use. Today the more is needed than theoretical, inadequate, and classical teaching systems in engineering education. Engineering and innovation are inseparable concepts. This symbiotic relationship is shown in engineers' workplaces, in engineering research and development processes but also is present in engineers' education methods. Innovation of the teaching methods in the field of Engineering is a mandatory activity due to several reasons.

Identify which are the main conclusions of the project that related to BBECs needs, opportunities and expectations.

The project with its activities will closing the gap in the inadequate green energy knowledge and skills of graduates of engineering-environmental faculties and help them to apply on the labour market.

Through the innovative curriculum and HED-RES-EU platform with open online education resources, the project will bring new opportunities for non-formal education as well. Realization of HED-RES-EU project will have impact on several levels: - Improve implementation of formal education, recognition and validation of informal and nonformal learning in the partner countries; - Improve renewable energy background and skills students graduated in engineering and environmental faculties to energy production and marketing, business, economics, governance etc. ; - Thanks to the accreditation of the developed ECTS project to improve student mobility not only in the European countries; - Increase employment and entrepreneurial opportunities for young graduates in the renewable energy sector.

Identification of the project

Title: BoostEdu – Boosting relevant and applicable continuing education in the food sector

Website: <https://boostedu.eu/>

Main objective: The objective of BoostEdu is to establish a platform for creating and implementing flexible continuous education for food professionals across Europe, in the first step targeting the need to develop innovation and entrepreneurship (I&E) skills in the European food sector.

Link to documents, if its available online

Brief summary of the project

The idea is to transfer the high quality, international, comprehensive knowledge efficiently and rapidly at the partner universities in the area of I&E to a wide community of food industries with the use of digital pedagogical tools and flexible learning methodologies, and thereby reduce the distance between academia and industry. The aim of the project was to create MOOC modules to ensure continuous education focused on innovation and entrepreneurship in the agri-food sector. In particular, 4 MOOC modules were created, each of them divided into 4 -6 sub-themes. For each theme, a short-video and a long-video were realised. Short-Video has the function to -present and introduce the theme to the participant, the long-video (7-15 minutes) has the function to deal with the theme in a synthetic and effective way. At the end of each video, it is possible to take a test consisting of 3 to 5 closed questions.

The modules are available online and in order to follow the courses it is sufficient to register on the platform.

The target audience of BoostEdu is food professionals; employees (technical staff and leaders), entrepreneurs and start-ups, together with students and lecturers at educational institutions, stakeholders representing the food sector and the general society.

The intended learning outcomes are:

- Learners will understand the key aspects of I&E in the food sector
- Learners will recognize the characteristics of entrepreneurship and intrapreneurship
- Learners will recognize the importance and role of the team
- Learners will understand different types of and the creative path towards innovation
- Learners will recognize the importance of a sound financial plan

Identify which are the main conclusions of the project that related to BBECs needs, opportunities and expectations.

The project is completed, and the MOOC modules are available online. The main conclusions that can be drawn in relation to BBECs' needs, opportunities and expectations can be derived from the structure of the MOOC modules and the approach taken by the project partners to transfer the content to the learners.

Identification of the project

Raw Matters Ambassadors at Schools – RM@Schools
 Flagship program in the Wider Society learning segment of the European Institute for Innovation and Technology (EIT RM)

Website: <http://rmschools.eu/>

Main Objectives:

- to promote a wide dissemination action on Raw Materials (RM)-related themes in schools and society through strategic European partnerships among research, university, school, and industry.
- to set-up and diffuse a common and replicable dissemination approach dedicated to young students (10-19 years old), starting from Research versus Schools and, in turn, reaching Society

Link to documents, if its available online

RM@Schools Project Trailer:

<https://www.youtube.com/watch?v=087NGya7r-E>

Young RM Ambassadors... in action

<https://www.youtube.com/watch?v=AIfxzslC1fc>

European Conference for schools in 2020 – virtual edition

<https://www.youtube.com/watch?v=zh79IKTN9aE&t=2s>

Brief summary of the project

RM@School 4.0 is an innovative program to make science education and careers in RM attractive for youngster.

An active learning is proposed to schools by RM ambassadors (experts in some RM-related issues and trained teachers) by involving students in experiments with RM-related hands-on educational kits, in excursions in industries, and in science dissemination activities. The students are asked to become Young RM Ambassadors themselves (science communicators) by creating dissemination products focused on some issue related to RM and /or collaborating with experts in supporting public events. In addition, teachers are trained to become RM Ambassadors themselves in the future at school and educational materials/tools are developed. All the produced materials are open and accessible online to everyone on Virtual Centre, on-line platform devoted to the project.

Raw Matters Ambassadors (RM@Schools) fosters and strengthens the motivation of students to deal with RM related STEM (Science, technology, engineering and mathematics) subjects. It helps them to choose a professional path in these fields and to ensure Europe to have future “experts” in these subjects. This is being obtained by offering them interesting and motivating hands-on- experiments which go further than usual school teaching programme and transforms students in active “players” in the outreach action.

Objectives:

1. Promote among youngsters the circular economy “vision”, entrepreneurial thinking and project management at schools by the creation of new learning paths focused on these topics.
2. Consolidate and extend the European network of Schools, Companies, Universities and Research Institutions available to collaborate each other's
3. creation of more international “chances” for youngsters to show them the opportunities and incredible benefits of a united Europe.
4. To increase understanding of the strategic importance of RM i.e., for high-tech, and their impact on Economy and foster entrepreneurial thinking among youngsters
5. Strengthening of the connections between educational-training period and job opportunities for youngsters
6. To promote co-responsibility within the young generation on the territory, making young people aware of the complexity and interrelation of RM with environmental sustainability issues, and prepare them to debate crucial issues in a way that can motivate them to take responsibility and implement appropriate actions.

Methodology:

RM@Schools has developed specific educational paths for schools on the innovation themes listed by EIT Raw Materials which are intended to lead the students through a range of teaching methods and ends with the creation of a student-created piece of work that lets the students interact with the wider community. Students are involved in an active learning process by using a combination of approaches such as frontal lessons, open discussion, learning by doing, peer-to-peer education, creating communication material and gamification.

Main results:

At the end of 2021 the European RM@Schools Network is composed by 140 Schools, 27 Companies, 11 Museum, 24 Universities and Research Institutes from 14 EU Countries.

20 toolkits and the corresponding supporting materials for encouraging an active learning at school have been developed in three years by the consortium's experts, and in some cases in collaboration with students who developed the lab activities. The toolkits and all the educational materials are shared on the Virtual RM@Schools Centre (e-learning platform - <https://rmschools.isof.cnr.it/moodle/>). Moreover, all the produced communication materials realised by pupils are accessible online on the project website (<http://rmschools.eu>). In three years, 35 Training workshops for teachers were organised and 840 teachers were trained.

RM@Schools contributed/organised 140 Public events in the last three years, so involving more than 27.000 people. Some of these events were organised in collaboration with other European initiatives, such as the European Researchers' Night, and others tutored/organised by Young RM Ambassadors.

Every year a European Conference of RM@Schools was organised to share the results obtained by students during the year. It involved delegates from European schools (students and teachers) in addition to the consortium partners.

During 2021, due to the Covid situation, the 6th European Conference was organised at distance and lasted three days, by offering 27 webinars by 14 Countries, in addition to a common Event. About 1800 participants took part to this virtual edition and was realised in collaboration with other two EIT Funded projects, RM@Schools-ESEE and ENGIE.

Identify which are the main conclusions of the project that related to BBECs needs, opportunities and expectations.



It is successful to develop cooperation between the three sides of the knowledge triangle: research, education, and business in order to introduce students to issues around the European challenges such as bioeconomy while promoting new professional careers in this sector

It is important

- to give value to all the disciplines by starting from the bioeconomic-related challenges, thus strengthening connections between science, creativity, and responsible citizenship
- To offer/create Opportunities for students to participate to international events and meet other EU youngsters.
- to foster a strong engagement of youngsters in the action towards society and the possibility for them to use their creativity, knowledges and skills in developing solutions
- To promote co-responsibility within the young generation on the territory.

Identification of the project

BIOVOICES

<https://www.biovoices.eu/>

BIOVOICES was a 40-month project (run from 2018 to 2021), funded under Horizon 2020 (GA: 774331), aiming at engaging all relevant stakeholder groups “voices” (policy makers, researchers, the business community and the civil society) in order to address societal, environmental and economic challenges related to bio-based products and applications.

Link to documents, if its available online

- Deliverable 3.4 - Guide for Mobilisation and Mutual Learning workshops
<https://www.biovoices.eu/download.php?f=39&l=en&key=7d8bc103e1b7d3bc1748c5a29c052074>
- Deliverable 4.4 - BIOVOICES methodological approach for Mobilization and Mutual Learning (MML)
<https://www.biovoices.eu/download.php?f=111&l=en&key=53491c2ff4014310b65cc09d617fcc34>

Brief summary of the project

BIOVOICES promoted Mobilisation & Mutual Learning Platforms (MML) and methods developed previously in European projects with the ultimate objective of delivering an Action Plan addressing the challenges of raising awareness of and engaging with the citizens on the bio-based products.

BIOVOICES objectives were to:

- 1) Define a framework for MML by reviewing barriers and opportunities for the development of bio-based value chains, identifying stakeholders and expected benefits from mutual learning and mapping bio-based products based on stakeholders' interests.
- 2) Launch the BIOVOICES multi-stakeholders' community and social platform to support and enable discussion, workshops, mobilization and mutual learning events.
- 4) Improve framework conditions for new bio-based market opportunities including action plans and processes, by involving in more than 50 co-creation events, at European, National and Regional level attracting experts.
- 5) Transform the experience of the BIOVOICES community in Actionable Knowledge for the different stakeholders, publishing recommendations and policy briefs to address the challenges related to bioeconomy.
- 6) Ensure that the BIOVOICES outcomes will have an impact on the different stakeholders, though and early impact, dissemination, communication and exploitation strategy.

BIOVOICES organized 70 MMLs events di MML for stakeholder empowerment and facilitation of systemic thinking for the uptake of the bio-based economy. The MMLs hosted case studies from projects and industries in the bioeconomy sector in order to inform, inspire and serve as a capacity building activity for professionals.

Identify which are the main conclusions of the project that related to BBECs needs, opportunities and expectations.

BIOVOICES contributed to the conceptualization of awareness, communication and stakeholder engagement in the bioeconomy by creating of the three-dimensional model “BIOWHAT, BIOHOW, and BIOACT”, stemming from the extensive and impactful communication activities that have been implemented by several European-funded projects. This model’s objective is to provide a framework by which to map and organize bioeconomy communication activities, thereby targeting stakeholders with different levels of maturity with regards to awareness of and engagement with the bioeconomy. The conceptual model deploys the three dimensions mentioned previously (i.e., BIOWHAT, BIOHOW, and BIOACT) through five interconnected actions (Inspire, Assess, Inform & Educate, Engage, and Co-create). Each action is comprised of several activities, tools, and channels that have proven to be effective in the context of the Eu-funded projects.

The BIOWHAT dimension is addressed through a suite of actions that aim to raise awareness and to inspire, but also to assess the perceptions, barriers, and worries of the public at large.

The BIOHOW dimension informs and educates, paying special attention to the young generations, future citizens, the workforce, and decision-makers.

Finally, the BIOACT dimension promotes bottom-up activities by which to engage and to co-create with the quadruple helix stakeholders (including the citizens) who work together to design shared industrial and political bioeconomy agendas.

With regards to activities connected to BIObec, BIOVOICES supported several stakeholders in the creation of innovative bioeconomy educational path, specifically:

- The creation of the “Bioeconomy Prize” inside the Start upper School Academy competition organized by Lazio Innova to develop entrepreneur skills for professional high school students. The prize is dedicated to ideas and projects dealing with bioeconomy. The activity includes the delivery of dedicated training to teachers and students about bioeconomy and bio-based products.
- The support of Friuli Venezia Giulia region in the organization of a MML workshop to define strategies and actions to design the regional educational hub in the bioeconomy through 3 axes:
 - 1) Anticipating enterprises training needs (entrepreneurs + workforce) in the bioeconomy sector;
 - 2) Train the trainers;
 - 3) Orienting young people.
- The implementation of educational activities in Primary Schools to increase awareness and knowledge about the bioeconomy and bio-based products. The activities were piloted with teachers from Italian primary schools, which received an info-education package about Bioeconomy, the socio-economic value of the Bioeconomy, examples of Bio-based products, the book for kids “What’s bioeconomy?”, Tips and suggestions to integrate the book in the school curriculum (hands-on activities, games, triggering questions). In parallel, their students (around 1.500) received a free copy of the book “What’s bioeconomy?” in Italian.

Identification of the project

LIFT

<https://www.lift-bbi.eu/>

LIFT was a BBI JU funded project running from 2019 to 2020 (GA: 837858) whose aim was to maximise the value and impact of CSAs in circular economy, promoting collaboration between stakeholders.

By providing a global overview of the overarching objectives and making recommendations for future effective CSAs, LIFT was able to boost coordination and collaboration, as well as

- To ensure that all stakeholders were on the same page and suitably positioned to make Europe's bio-based industry stronger and more competitive
- To position Europe as a leader in decoupling economic growth from resource use and environmental impact with creation of a coherent and stimulating environment for a sustainable European bio-based industry.

Link to documents, if its available online

LIFT Bioeconomy library mapping more that 65 projects and their results:

<https://www.bioeconomy-library.eu>

Factsheets on 11 topical categories:

<https://www.bioeconomy-library.eu/factsheets/>

Bioeconomy Education factsheet:

https://www.bioeconomy-library.eu/wp-content/uploads/2020/03/02_LIFT_FactSheets_education.pdf

Brief summary of the project

LIFT project mapped the completed and ongoing CSA projects and analysed them to provide a global overview of their results and findings. This allowed for a gap analysis, including which challenges remained to be addressed and provided recommendations.

Moreover, the project increased awareness of the contribution that CSAs achieved in addressing bioeconomy-related challenges and ensured that their outcomes were communicated more widely, increasing the impact and exploitation.

The results of the project were organized in 11 topical categories, grouped in 4 macro-areas:

- Communication, education and stakeholders' engagement (Awareness raising, Bioeconomy Education, Stakeholders engagement and co-creation)
- Policy Framework (Standardisation, LCA, labelling and regulatory hurdles, regional potential and bioeconomy strategies and implementation action plans)
- From Research to Market (Uptake of RTD results, Foresight, market studies and market roadmaps)

- Value chains and innovation ecosystems (Biomass availability, quality, supply and sustainability, new value chains and business models, Open innovation platforms and facilities, Industrial road-mapping)

Thanks to the collaboration with the European Bioeconomy Network and BBI JU, LIFT facilitated the knowledge exchange as well as collaboration among the targeted projects, in particular during the 2019 BBI JU stakeholder forum, where 38 projects were involved in a series of mobilization and mutual learning workshops.

Identify which are the main conclusions of the project that related to BBECs needs, opportunities and expectations.

The Bioeconomy Education factsheet mapped in a single document all the projects in this domain and summarized their main outcomes, gaps still to be addressed and recommendations for future activities in bioeconomy education. Many initiatives and projects beyond the CSAs were also mentioned pointing out their role in promoting education, training and skills across the bioeconomy, addressing different educational levels.

The factsheet highlights the important role of education in driving the structural change toward a more sustainable production, consumption and lifestyle. However, the following gaps to be addressed were identified:

- Currently sustainability and circular bioeconomy are not sufficiently addressed by traditional school curricula.
- Poor connection among different programmes (Erasmus+; Interreg, H2020, BBI JU); Insufficient collaboration, networking and knowledge sharing on bioeconomy topics between educational providers;
- Competences and skills needed to exploit the opportunities offered by the bioeconomy are still underexplored. Poor connection with the sector-specific labour market needs and to the future demand for skilled workforce along the entire value chain;
- Bioeconomy education at universities is still very limited, technology-driven rather than interdisciplinary and not cross-sectoral.
- Need to explore where bioeconomy principles and contents can be integrated into already existing educational curricula to enrich the skills and competences of the students increasing their employability;
- Lack of education curricula targeting potential beneficiaries like primary producers, procurers, entrepreneurs, start-ups, and policy makers, about opportunities offered by the bioeconomy tailored to their needs, language, time availability, delivery preferences, etc;
- Regional authorities need support in the identification of educational skills based on the local resources and needs;
- Transversal skill and competences are increasingly needed for a complex and rapidly evolving sector like bioeconomy;
- To compete in the bioeconomy, companies need skilled workforce. How to make the younger generation interested in bioeconomy studies and careers to fulfil the growing demand of talents?

Finally, in order to tackle these gaps, the factsheet also offers the following recommendations:



- Facilitate the networking, knowledge sharing and collaboration among different programmes, projects and initiatives (like the European Bioeconomy Network), as well as among universities (such as the European Bioeconomy University).
- Stimulate the debate around education in bioeconomy towards an improved educational system better responding to the bioeconomy evolutions, involving industrial players, regional authorities, Member States, education providers and other relevant stakeholders.
- To address the evolution of the bioeconomy labour market, new skills and competences should be identified, to make sure that the future workforce responds to the real (and updated) needs of all bioeconomy sectors (primary production, industry, etc.). These skills should include transversal competences that are needed to address the complex challenges of the bioeconomy.
- New formats for the delivery of bioeconomy education should be explored to better respond to the different emerging needs, exploiting the good practices implemented by different projects and initiatives.
- Examples are Mobilization and Mutual Learning (MML), Living Labs, co-creation of knowledge and the integration of bioeconomy into existing curricula and programmes.
- To maximise the opportunities offered by all areas of the bioeconomy and contribute to the creation of an innovation ecosystem, new educational paths targeting feedstock providers, policy makers (including public procurers), intermediaries, entrepreneurs, multipliers (like teachers and media) should be implemented.
- Education needs and curricula should be designed and implemented at regional level, to better tailor the focus on the specific regional resources and conditions; nevertheless, an integrated vision of the educational framework should be designed centrally (at European level) and deployed locally (even with the support of dedicated projects supporting the regions in this process).
- School activities, starting very early (primary school or before) are fundamental to grow a future generation knowledgeable and sensitive to environmental issues through info-education programmes (using appealing channels and tools such as games, social media, competitions, videos, and live events). This will help rise a generation that is informed, inspired and interested in bioeconomy, thus attracting talented youngsters towards education and career in this domain.

Identification of the project

European Bioeconomy Network

<https://eubionet.eu/>

The European Bioeconomy Network (EuBioNet) is a proactive alliance of more than 100 EU funded projects and initiatives dealing with Bioeconomy promotion, communication, and support. The main goal is to maximise the efforts, increasing the knowledge sharing, networking, mutual learning, coordination of joint activities and events.

Link to documents, if its available online

Brief summary of the project

The European Bioeconomy Network works in close collaboration with the European Commission and BBI JU/CBE JU, to ensure that the objectives identified by the Bioeconomy Strategy update will be properly communicated, addressed and implemented. In fact, the European Commission recognized the importance of the EuBioNet: the update of the Bioeconomy Strategy mentions the network on page 84, 85 and 86 as a key player for promoting and communicating bioeconomy.

The main objective is to maximize the impact of the projects participating, creating opportunities and networks and by significantly increasing the awareness of bioeconomy in Europe, thanks to the joint efforts of the involved projects.

Specifically, the mission is to:

- increase the awareness of sustainable circular bioeconomy in Europe
- stimulate the debate, knowledge sharing and mutual learning to address bioeconomy related challenges and opportunity
- identify impact-oriented strategies to boost the sustainable circular bioeconomy in Europe
- facilitate networking among stakeholders
- strength the role of the European Commission in supporting the sustainable circular bioeconomy uptake
- maximise the impact of the EU funded projects, promoting joint initiatives

With its activities, the EuBioNet facilitated more than 200 collaborations among bioeconomy related projects and initiatives.

Identify which are the main conclusions of the project that related to BBECs needs, opportunities and expectations.

EuBioNet stimulates the debate through thematic working groups to discuss relevant challenges, aggregate results from different projects and facilitate their exploitation in local and regional contexts, in order to support the bioeconomy ecosystem creation. The thematic working groups facilitate mobilisation and mutual learning of the relevant EuBioNet partners and expand the discussion to a larger community of stakeholders.

The updated European Bioeconomy Strategy points out the importance to “Promote education training and skills across the Bioeconomy”. In fact, education at all levels has been identified as the main driver for the deployment of sustainable and circular bioeconomy to facilitate economic transition and to meet the current needs of the developing bioeconomy and the move to carbon neutrality by 2050.

Therefore, to better discuss this topic, a specific working group in Bioeconomy Education was created inside the EuBioNet highlighting the need to:

- identify the educational gaps
- identify the educational needs per each stakeholder
- map the bioeconomy education activities and the different target groups
- map and make available the knowledge deriving from the projects
- analyse the geographical footprint/impacts of the projects
- organise regular meetings to keep all new educational material created by EuBioNet partners updated
- identify the most impactful training material for different target groups
- optimise the available materials and collect them in a library
- identify new potential multipliers to support educational activities

These needs were pointed out by the working group as crucial to be addressed by current and future projects dealing with bioeconomy education. The need to share lessons learnt and case studies among the various projects was also highlighted as key to meet future skills for the bioeconomy education, by framing innovative approaches responding to present and future market needs in the bioeconomy education, targeting students and workforce.

The collection of contents will be facilitated by the EuBioNet and the role of the network will be also to facilitate connections with industries and other relevant actors.

The EuBioNet working group in Bioeconomy education, with Transition2Bio, the European Community of Practice for Bioeconomy Education, BIOSKILLS, BIObec and the European Bioeconomy University (EBU), will be also the promoter of the workshop “Paving the way towards Sustainable Entrepreneurship Education”, to be held next 15 March 2022 and involving projects and initiatives interested in the intersection of Entrepreneurship Education (EE) and Sustainable Education (SE), with a special focus on circular and sustainable bioeconomy. The aim of the workshop will be to identify how the cross-fertilisation of EE and SE can help design educational curricula and extra-curricular activities for sustainability-minded entrepreneurs of tomorrow.

Identification of the project

BIOBRIDGES

<https://www.biobridges-project.eu/>

BIOBRIDGES was a BBI JU funded project (GA: 792236), run from 2018 to 2020 to tackle the key challenge of improving the marketability of bio-based products (BBPs) by fostering close cooperation and partnerships among bio-based industries, brand owners and consumers' representatives.

The project also stimulated and supported the active engagement and interaction of other stakeholders relevant on promoting the bioeconomy, such as policy makers, public authorities, clusters, CSOs, NGOs, researchers, associations, local communities, aiming at improving market acceptance of bio-based products.

Link to documents, if its available online

A Bio-Based Day – Video:

<https://www.biobridges-project.eu/en/results/a-bio-based-day-video/>

BIOBRIDGES plan that operationalizes the co-creation and Mobilisation and Mutual Learning (MML) process:

<https://www.biobridges-project.eu/results/biobridges-platform-design-what-who-and-how/>

Bioeconomy value chain collaboration challenges model:

<https://www.biobridges-project.eu/en/results/biobridges-value-chain-collaboration-challenges-model/>

Bridge2Brands model:

<https://www.biobridges-project.eu/news-events/news/bridge2brands-an-innovative-format-to-connect-brands-and-bio-based-solution-providers/>

Bridge2Value model:

<https://www.biobridges-project.eu/news-events/news/create-new-value-chains-in-5-steps-the-bridge2value-methodology/>

Brief summary of the project

Among its main activities, BIOBRIDGES contributed to:

- Identify the main challenges, barriers, drivers for the cooperation among bio-based industries, brands and consumers, through detailed literature reviews, interviews and focus group.
- Create a multi-stakeholder community and stimulate the dialogue through innovative co-creation and mutual-learning actions and events.
- Set up a pool of Ambassadors (#BioHeroes), to support the project with relevant insights and raising the interest towards bioeconomy.

- Run effective communication and co-creation activities like videos and serious games, to increase and improve consumers' awareness, confidence and trust on the benefits of BBPs compared to the fossil-based counterparts.
- Organise policy debates at local and regional level to discuss the pros and cons of bio-based products and processes and how these could be addressed by policies in the context of regional bio-economy strategies.

Moreover, the project was focused on achieving the following results:

- Good practices on collaborative cross-cutting interconnections with illustrative examples that provide valuable insights to bio-based industries, brands owners and other stakeholders, about the factors influencing successful collaborations.
- Evidence-informed, value-driven and socially robust procedures and know-how easy to be adopted and replicated by relevant stakeholders to create new cross-sector interconnection in bio-based economy clusters.
- An action plan with guidelines and recommendations for raising consumers' awareness of sustainability as well as the benefits and opportunities of BBPs.
- The identification of those bio-economy sectors' enabling most profitable cooperation and a set of recommendations about creating new value chains and better target existing value chains.
- Ultimately, through the co-creation activities, best practices and recommendations deriving from the project, BIOBRIDGES aimed to establish new cross-sector interconnections in bio-based economy clusters.

Identify which are the main conclusions of the project that related to BBECs needs, opportunities and expectations.

BIOBRIDGES created the two formats Bridge2Brands and Bridge2Value, with the aim to facilitate collaboration and knowledge exchange between brands and bio-based industries and between the different players in the value chain.

In this context, BIOBRIDGES established primary partnerships between brand owners, bio-based industries and consumers representatives to foster the acceptance and uptake of bio-based products to consumer markets, thus creating new bio-based value chains.

Bridge2Brands is an innovative format to connect brands and bio-based solutions providers. This format is based on the fact that more and more often, consumers are choosing brands that make responsible use of the world's finite resources, support an eco-conscious lifestyle and strive to make a lasting, positive social and environmental difference around the globe. Bridge2Brands initiative aimed to facilitate the connection and collaboration between brands, willing to embrace a more sustainable approach in their business, and bio-based industries and research players providing ground-breaking solutions to the specific challenges identified by the brands.

Bridge2Value is an innovative format to create cross interconnections between quadruple helix stakeholders towards the creation of a new value chain. In particular, it promotes an inclusive



approach, involving the stakeholders that are often excluded from this type of activities, like the primary sector.

The main challenge of the Bridge2Value format is to create fresh opportunities in sectors underexploited that could be valorised thanks to the creation of new circular bioeconomy value chains.

The methodology follows 5 steps that have been designed to enable a modular approach, also supporting the scale-up from national to European level.

- **Engage:** Build up a working group involving key stakeholders in the value chain; Make sure to involve all the relevant stakeholders from different categories, including those from the primary sector.
- **Inspire:** Facilitate the exchange of good practices and the identification of challengers through inspirational case studies
- **Co-create:** Support the co-creation of solutions responding to the specific challenges identified by and relevant for all the stakeholders
- **Actionate:** Mobilise additional stakeholders to jointly address the challenges; Transform the results into guidelines and recommendations; Define a shared action plan for the creation of the value chain
- **Scale:** To scale from a national to a European level it is needed to:
 - Identify the challenges that are common and relevant at national and European level (through surveys, interviews, focus groups, etc.)
 - Identify transferable good practice from the national case studies
 - Use the Bridge2Value methodology implementing the steps described above with European stakeholders.

This methodology was validated during 2 events organized by BIOBRIDGES and has been considered effective for the creation of cross sector interconnections by the stakeholders. The participants also declared that the Bridge2Value played a catalytic role in initiating collaborations towards the creation of the value chain.

Identification of the project

As part of the project implemented as part of the Integrated Qualifications System, work is underway on the preparation of the Sectoral Qualifications Frameworks in:

- Food processing sector
- Water and sewage management and reclamation sector
- Waste management sector

The initial pilot work conducted in 2013–2014 showed that the Polish Qualifications Framework, which is intended as a reference point for all qualifications awarded in Poland, does not always adequately reflect the specific nature of different sectors of the economy. Therefore, work was begun on developing instruments known as sectoral qualifications frameworks, which by adapting to the needs of a given sector, as well as by using its characteristic terminology, can provide a bridge between the world of education and the labour market.

Link to documents, if its available online

The Sectoral Qualifications Frameworks related to the bioeconomy sector are not finished yet, here is the link to the publications from the other Frameworks.

<https://kwalifikacje.edu.pl/ramy-sektorowe/?lang=en>

Brief summary of the project

Objectives, context

The creation of the Sectoral Qualifications Framework is one of the elements of the overall work to develop and implement the Integrated Qualifications System (IQS) in Poland.

The IQS was established in Poland with the Act of 22 December 2015 on the Integrated Qualifications System¹ (Hereinafter, the IQS Act). The purpose of this law was to better adapt the education system to the changing needs of the labour market. The IQS is a significant component of implementing the lifelong learning (LLL) policy in Poland. Its creation fulfils the Recommendation of the European Council on the European Qualifications Framework and is also consistent with the Integrated Skills Strategy, which aims to coordinate public policies at different levels of Polish state administration in this area.

The main idea behind the IQS is an understanding of qualifications as “a set of learning outcomes in the categories of knowledge, skills and social competence, acquired in formal education, non-formal education or through informal learning, in accordance with the requirements set for a given qualification, the achievement of which is assessed through validation and formally confirmed by an authorised awarding body” (art. 2, point 8 of the IQS Act). It is assumed here that a qualification confirms what a person has learned regardless of the manner in which such learning has taken place.

In order to compare different qualifications included in the Integrated Qualifications System, the Polish Qualifications Framework (PQF) was developed. Because it was referenced to the

European Qualifications Framework; it is possible to easily compare qualifications awarded in Poland to those awarded in other European countries.

Methodology

The selection of the sectors, for which sectoral qualifications frameworks are developed, is based on several criteria. First of all, those sectors that are strategic for the Polish economy and labour market are supported. This is reflected primarily through their contribution to the gross domestic product and employment, but also through their presence in national strategic documents, such as the Strategy for Responsible Development. Second, the functioning of such tools is more relevant for sectors undergoing rapid technological change, especially relating to automation and robotisation, which lead to changes in the demand for workers' competences. The third criterion, which is often the result of technological changes, entails the occurrence of competence gaps resulting from the mismatch between the educational offer and the needs of employers in the sector.

The last criterion, which is also a sine qua non for starting work on an SQF, is the demand for such a tool expressed by key stakeholders of the sector.

The most important element of the SQFM are the qualification level descriptors. After defining the sector's boundaries and defining the sectoral determinants and activity contexts, the project team elaborated descriptors that constitute synthetic descriptions of the qualifications in sectors including its subsectors. The qualification descriptors were validated during the competence study, where the entries were critically analysed and appropriately generalised and supplemented. The project developed SQFs level descriptors that are fully aligned with the Polish Qualifications Framework, meaning that they are presented in the form of learning outcomes and reflect the progress of a learner: they show how learning in different contexts and at different stages of life results in gains in knowledge, skills and social competence.

Main results

Main areas in which SQFM can be applied

- to adapt the formal and non-formal education offer
- to support the process of recruiting, selecting and assessing employees
- For educational and career counselling
- To adapt validation and certification to the specificity of the sector
- to describe the requirements of job positions
- For professional career planning, the valuation of work and remuneration
- to update the offer of vocational education
- To develop new qualifications

Identify which are the main conclusions of the project that related to BBECs needs, opportunities and expectations.



The IQS gives the opportunity to develop and detail the provisions of the Qualification Framework, so that they can meet needs of the industry. Their task is to combine the PRK language with the terminology specific to a specific sector of the economy. It brings the business and science environment closer, allowing to develop a common language of speaking about skills as measurable, objective learning outcomes.

IQS enables / facilitates

- animating cooperation among representatives of the sector to identify key competences and qualifications,
- arranging the identified competences and qualifications
- facilitating the description of new qualifications and competence
- increasing the comparability of qualifications within the sector in Poland and in Europe,
- creating the basis for designing educational programs and training in line with the needs of the labour market.

Identification of the project

THE EUROPEAN GREEN GOOD
- ASSESSMENT OF KNOWLEDGE AND ATTITUDES

<https://lewiatan.org/>

The aim of the project is to diagnose Polish needs companies in connection with the green transformation and their mobilization to promote your attitude on national and European forum, in relations with administration, business and NGOs. One of the pillars the project is to diagnose the knowledge and attitudes of companies' members of the Lewiatan Confederation.

Link to documents, if its available online

https://lewiatan.org/wp-content/uploads/2021/08/zielony_lad.pdf

Brief summary of the project

Context

Based on the experience of the Green Transition Council functioning from 2020 in the Lewiatan Confederation, it was assumed that effective representation of the business community in the discussion on climate neutrality requires assessment of the level of knowledge of company representatives in this topic, determination to contribute to the process of energy transformation and diagnosis barriers to greater involvement in this issue.

Methodology

The survey based an online survey active on November 16-24-2020. The questionnaire was divided into 5 modules, from the BIObec point of view, module I is the key one. KNOWLEDGE ABOUT THE CONTENT OF THE EUROPEAN GREEN GOVERNMENT - 11 questions concerning selected aspects: key goals, areas priority and strategic choices that the EU identifies in connection with the transformation, this part of the survey is used to assess which areas are better recognized and which are worse, as well as the distribution of knowledge among companies (risk of polarization). 49 member companies of the Lewiatan Confederation participated in the survey. The sample was not representative of the population of enterprises in Poland. The sample includes overrepresentation of large entities and representatives of the industry sector.

Main results

In the surveyed sample, 73% of companies responded more than half of the questions correctly, which would indicate good discernment on EGD issues. 20% of respondent correctly answered two or less questions. These respondents often omitted knowledge module or opted out of completing the survey. They realize business risks with this related.



Individual aspects of EZD are characterized by a differentiated diagnosis among respondents. The five areas are well known by respondents. They are aware of the role of industry in creating a circular economy (97% of correct indications), the role of intermediate goals on the way to climate neutrality (95%), energy renewable (92%), digital transformation in the new industrial policy (87%) and the pro-environmental character of the support under the Fund Reconstruction (89%).

Identify which are the main conclusions of the project that related to BBECs needs, opportunities and expectations.

The survey showed that representatives of Polish business generally have knowledge of the circular economy, but the awareness of the transformation of the economy in this area is still not satisfactory. Understanding the need for change is essential to engaging respondents in the BIObec project and collaboration with BBEC.

These data can be related to the results of group interviews conducted within BBEC. The discussions lead to the conclusion that there is still little understanding of the bioeconomy and treating the products of the sector as incomplete products. Business representatives perceive the bioeconomy and investing in this sector as a cost.

Identification of the project

Transition2BIO – Support the TRANSITION towards the Bioeconomy for a more sustainable future through communication, education, and public engagement

<https://www.transition2bio.eu/>

Transition2BIO will built upon the most relevant communication and education EU funded projects and initiatives to contribute to the implementation of the updated 2018 EU Bioeconomy Strategy and promote the transition towards a more sustainable production, consumption, and lifestyle by implementing an integrated package of activities addressing a wide range of target stakeholders, namely: DEMAND SIDE; SUPPLY SIDE; MULTIPLIERS and SUPPORTIVE ENVIRONMENT

Link to documents, if its available online

https://www.transition2bio.eu/public_result/

<https://www.transition2bio.eu/toolkit/>

<https://library.transition2bio.eu/>

Brief summary of the project

The project is

- Valorising and exploiting sectoral communication tools and activities developed at national, regional, and local level by EU funded bioeconomy projects and other relevant initiatives
- Raising awareness on bioeconomy at large and the related environmental and socio-economic impacts for European citizens through communication activities
- Contributing to the transition towards a more sustainable production, consumption and lifestyles through engagement and education activities
- Contributing to the deployment of the regional bioeconomy strategies by providing Member States and Regions with methodologies, mentoring, capacity building, tools and materials to raise awareness and communicate bioeconomy (contributing to action 2.3 of updated EU Bioeconomy Strategy)
- Facilitating the identification of the educational and training needs towards the creation of an innovation ecosystem for bioeconomy (contributing to action 2.4 of updated EU Bioeconomy Strategy)
- Strengthening the European Bioeconomy Network to maximize the collaboration among and impacts of EU-funded projects in bioeconomy (contributing to action 2.3 of updated EU Bioeconomy Strategy)

Transition2BIO is promoted by the founders of the European Bioeconomy Network, an alliance of more than 100 projects and initiatives promoting Bioeconomy. The project partners are involved in the most relevant communication and education EU funded projects (BIOVOICES,



BLOOM, SHERPA, BE-Rural, Bio bridges, LIFT, NEXTFOOD, BoostEdu, etc) and initiatives like the European Bioeconomy University.

The project delivered awareness, communication and education toolkits aimed at different stakeholders and a library collecting awareness, communication and education materials from several EU sources. These have been built upon a conceptual framework of the toolkits and a huge collection of existing awareness, communication and education materials in the European bioeconomy.

Identify which are the main conclusions of the project that related to BBECs needs, opportunities and expectations.

The project is in progress. The main conclusions that may arise related to BBECs' needs, opportunities and expectations will come from activities aimed to support the Member States and Regions in awareness, communication and education activities in bioeconomy; particularly from the organization of co-creation workshops to identify future skills and related educational needs in the European bioeconomy.

The Integrated package the project Transition2bio has designed provides contents on Bioeconomy and its sectors, presenting an overview of inspirational good practices stemming from different European Funded projects, as well as methodological approaches to perform bioeconomy awareness raising, communication, education and stakeholder engagement activities. As part of the capacity building package, debate, mutual learning, good practices exchange and collaboration will be facilitated among national, regional and local policy actors, on challenges related to awareness raising, communication and education. To increase the sustainability, the modules will be recorded, and made available beyond the project lifetime.

Additionally, to increase the impact beyond the Transition2Bio project's planned activities, partners are experimenting alternative deployment formats, in partnership with the target beneficiaries of the capacity building:

- The Italian region Friuli Venezia Giulia will integrate the package in the regional catalogue of capacity building activities for regional employees, recognizing professional credits. The format is pre-recorded sessions.
- Collaboration with other projects for "train the trainers" activities targeting the project partners that will benefit from these new capacities to implement their activities in the regions (e.g., create the innovation ecosystem for the bioeconomy strategy). An example of this activity will be done in collaboration with GoDanuBio and BIOEAST.

The capacity building package will increase the capacity of Member States and Regions in bioeconomy awareness, communication, education and stakeholder engagement, through 5 modules:

Module	Title	Duration	Format
Module 1	Specific Knowledge (Circular and sustainable bioeconomy)	60 minutes (online recorded)	Experts talk



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Module 2	Good Practices and Replicable formats	30 minutes (online recorded)	Lecture
Module 3	Methodologies and models	60 minutes (online recorded)	Lecture + (optional) interactive workshop (at least 30 min.)
Module 4	Transition2Bio Toolkits	30 minutes (online recorded)	Lecture + provision of Toolkits
Module 5	Knowledge exchange and mutual learning	90 minutes (live streaming)	Multistakeholder workshop

Specifically, each module is organized as follows:

Module 1: Specific knowledge (circular and sustainable bioeconomy)

- Bioeconomy and application sectors (JRC-KCB/DG RTD)
- Benefits of the bioeconomy, the circular economy and the bio-based sectors (BIC/EIT FOOD)
- The role of the bioeconomy in the European policies (JRC-KCB/DG RTD)
- How regional policy priorities can be leveraged to support the ecological transition? (DG Regio)
- The role of awareness, communication and stakeholder engagement for the creation of the innovation ecosystem for the bioeconomy (Transition2Bio)

(Module in collaboration with: EU funded projects, JRC - Knowledge Centre for Bioeconomy, Clusters, Universities)

Module 2: Good practices and replicable formats

- Presentation of inspirational good practices to:
 - Inspire
 - Assess
 - Inform and Educate
 - Engage
 - Co-create
- Case studies

Module 3: Methodologies and models

- Methodologies to drive the systemic mindset change
- Methodologies to facilitate multistakeholder debate and co-creation
- Methodologies to facilitate the planning of communication and Stakeholder engagement activities

Module 4: Transition2BioToolkits

- Tools for Awareness and Communication
- Tools for Stakeholder engagement and co-creation

Module 5: Knowledge exchange and mutual learning

Organization of 1 Knowledge exchange and mutual learning workshop with the participants to the Transition2Bio Capacity Building package to exchange experiences and consolidate the educational pathway.

Identification of the project

ABBEE (<https://abee.eu/>)

The ABBEE (Accelerating the transition towards the Bio-Based Economy via Education) project aims to enhance Europe's competitive position in the field of bio-based economy and prepare students for their future in a bio-based economy by improving education and facilitating innovation.

Link to documents, if its available online

<https://abee.eu/>

Concepts of Sustainable Bioeconomy- <https://iversity.org/en/courses/concepts-of-sustainable-bioeconomy>

Brief summary of the project

ABBEE is an EU collaboration between Wageningen University and Research (the Netherlands), University of Hohenheim (Germany), University of Eastern Finland (Finland) Aarhus University (Denmark) and other key stakeholders in industry and research. Four blended and interconnected learning modules have been created by the academic institutions in their respective expertise, each addressing a vital part within the bio-based economy value chain.

Within ABBEE, four courses were developed:

- 1- Concepts of sustainable bioeconomy
- 2- Forest bioeconomy in Europe
- 3- Agroproduction for biorefining and bioenergy
- 4- Advanced sustainable entrepreneurship

Identify which are the main conclusions of the project that related to BBECs needs, opportunities and expectations.

1. Teach interdisciplinarity through a MOOC is only possible with the right moderation and active participation of instructors, a thematic structure is not enough and a good connection between students and students with instructors could help to achieve it.
2. The course of "concepts of sustainable bioeconomy" is delivering the basic knowledge on bioeconomy-related topics. These topics should be worked and taught further to deliver the necessary knowledge for someone who will specialized on a bioeconomy-related topic
3. With the pandemic, people in general do not see the online courses as the best opportunity as before to learn something because the context has tired people of being in front of a computer too much time. Therefore, the communication and marketing of



MOOCS require extra efforts together with the development of the right pedagogical strategies for a virtual environment.



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Identification of the project

EBU label/ <https://european-bioeconomy-university.eu/education/ebu-label/>

The project EBU label seeks to offer a common qualification supplement that will be granted to master students of bioeconomy-relevant study programs offered at the six EBU partners. This label is to upgrade and connect existing, disciplinary university curricula on the master level with inter-and trans-disciplinarity, cross-sectoral collaboration and sustainability competencies. It will explicitly promote and equip the students with an understanding of related disciplines and their scientific language, in addition to disciplinary expertise.

Link to documents, if its available online

Brief summary of the project

Through the fulfilment of certain criteria, master students of bioeconomy-relevant master programs will be able to develop the right skills and competences to become a change agent in the transition towards a sustainable bioeconomy.

Within this project, The EBU Student journey is being developed and offered. The EBU Student project consists of a series of online and on-site activities of interdisciplinary groups. The students will make some industry visits and work on a bioeconomy challenge, will have the opportunity to discuss ideas and share knowledge.

The main results of the project are:

- Development of the EBU label: offer the Ebu label at the six EBU universities
- Development of a joint platform for the online activities of the Journey
- Two pilot journeys: the on-site meetings will be in Bologna (June 2022) and in APT (2023)

Identify which are the main conclusions of the project that related to BBECs needs, opportunities and expectations.

1. The joint work between the six universities requires many efforts, especially with an offer like the EBU label that is foreseen to last longer than the 3-year project. The bureaucratic constraints need to be solved through the flexibility in the norms and speed of processes.
2. The need to balance between practicality and desires is imperative. The main objective should prevail if the results want to be seen in a short-term period of time.
3. As this project has not ended, still many conclusions are still to be established in the next two years

Identification of the project

<http://www.bioeast.eu>

Link to documents, if its available online

The BIOEASTsUP deliverables will be provided [here](#)

D1.2. Report on analysis of BIOEAST national bioeconomy related sectors

D1.3. CEE virtual toolbox: draft

D1.4. Bioeconomy institutional profiles – comparative analysis, benchmarking and policy recommendations

D3.4 BIOEAST foresight exercise report is available [here](#)

D.4.2. “Report on the state-of-the-art innovation gaps and needs of the bioeconomy related research and innovation the BIOEAST macro-region”

Brief summary of the project

The overall objective of the BIOEASTsUP project is to support the BIOEAST Initiative to implement the [Vision paper](#), in particular the BIOEASTsUP project supports the implementation of bioeconomy in the BIOEAST macro region by delivering initial analysis of bioeconomy sector (D1.2.), innovation gaps and needs (D.4.2.), foresight report (D. 3.4.), BIOEAST SRIA (in the development phase) and concept papers for national bioeconomy strategies (in the development phase). The BIOEASTsUP project also support 7 BIOEAST [Thematic Working Groups](#), that are developing Thematic SRIAs.

Project timeline with the key information is available [here](#)

Identify which are the [main conclusions of the project](#) that related to BBECs needs, opportunities and expectations.

The Thematic Working Group Bioeconomy Education is mapping the status que of the bioeconomy education, requirements, needs and potential that can be used for shaping the BBECs focused on the BIOEAST macro region.

Identification of the project

Project: BIO-ERKO

Web link:

<https://www.biotalouskoulutusitasuomi.fi/en/>

Objectives:

1. First implementation (2018-2020): to develop a new work-based learning and teaching model
2. Second implementation (started in September 2020): to develop international bioeconomy competence in Eastern Finland by working life oriented continuous learning

Link to documents, if its available online

Brief summary of the project

The activities of the project are located in Eastern Finland and are organized jointly by the University of Eastern Finland, Karelia University of Applied Sciences, and Savonia University of Applied Sciences.

The specialization studies are a new form of training offered by the universities, designed to complement previous degrees for people working in certain professions so that they would have stronger expertise in their current jobs. The specialization studies are offered in cooperation between the universities and employers in fields where degree programmes are not available. Teaching and learning are based on company-specific development tasks.

The studies are completed within 18 months, which are carried out as multiform teaching, consisting mainly of online studies, but also including contact days. Teaching and learning are based on company-specific development tasks.

The studies are organized with special funding from the Ministry of Education and Culture. The development of the new work-based learning and teaching model (piloted in the bioeconomy specialization studies in 2018–2020) was funded by the European Social Fund.

The target audience and participants:

- People who work, or will be working, in the field of bioeconomy in companies, consultation or promotion tasks, or as vocational teachers, or who operate in the public sector to promote bioeconomy.
- Entrepreneurs or individuals who aim to become entrepreneurs in the field of, for example, bio-based production and raw material procurement for bioproducts.

The applicants must have a suitable university degree or other degree suitable for the field of bioeconomy.



Identify which are the main conclusions of the project that related to BBECs needs, opportunities and expectations.

The specialization studies bring a new form of training offered by the universities in cooperation with industries, designed to complement previous degrees for people working in certain professions so that they would have stronger expertise in their current jobs.



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5. Summary and Conclusions

According to the results, it will be **difficult for companies to find people with the right competences to fulfil the industry needs** in the near future, since professionals should be able to deal with new sustainability requirements, as well as the technification of the processes. The current workforce is mainly labour-intensive, and it will be important to train and prepare these people to work in a more capital/technology intensive industry.

The results regarding the identification of training needs and the development of new training programmes also highlight the **concern of stakeholders with the slowness of educational institutions**, such as universities and VET schools, to update, design and implement new training programs according to the needs of the industry. Regarding the official training programs, there is a high accord to consider that **bachelor and master's degrees should provide not only a solid basis of knowledge in the existing disciplines (e.g., biology, chemistry, engineering, etc.), but also knowledge from other sectors of the bioeconomy sector**. Most of the stakeholders do not think that specific programs should be implemented, but re-adapt the existing ones to provide knowledge and competences to future professionals to better understanding between them when they will be asked to work together to solve problems and market challenges. Most of the companies are implementing in-house training to give their professionals specific skills and knowledge that couldn't be acquired outside because there is a lack of identification of these needs from the training institutions; this is a problem for small companies that cannot effort to provide specific training to their workers.

Participants in the study agree on the idea that **BBECs should work closely with industries and education providers and act as an observatory** to identify which are the current training gaps and future industry needs in order to facilitate the design and implementation of new programmes. More than 80% of the participants consider that **It's important to identify which are going to be the main professional roles in the field of bioeconomy and circular economy**. To do so, and as it can be seen in the figure 29, in almost all the regions (north Europe, Central Europe, Mediterranean Europe and East Europe) the participants consider that the stakeholders that should participate in the BBECs are Universities, Companies, Research Institutions, Educational Organisations and Public Administrations. Further insights should be recovered in each region in order to know how these different stakeholders should be involved and how can BBECs can foster the dialogue and collaborative work between them.

Furthermore, more than 90% of the survey respondents considered that **BBECs should work to provide citizenship awareness regarding the importance of the bioeconomy and circular economy to foster sustainability.** In this way, they highlight the importance to design a training ecosystem where citizens can find different options for training themselves at different levels, as well as to **facilitate resources to improve the collaboration with primary and secondary schools.** The collaboration with compulsory education institutions should be implemented through different kind of activities such as training the future teachers, provide resources to be used in the schools, or the organisation of activities where schools' students can participate. It's important to **identify in which are the contents that should be include in all educational levels to improve the awareness and collaboration of the society** to foster sustainability system and improve circular economy. The figure 28 of the report summarizes which are, from the point of view of participants answering the survey, the educational levels were more work must be done to improve the knowledge about bioeconomy and circular economy. Considering the results globally, secondary education and bachelor's degrees were selected in the same degree of importance by stakeholders.

Considering the results of the qualitative study, the activities that should be implemented by BBECs in the framework of training are:

- Connect institutions providing training in the field of bioeconomy and circular economy.
- Facilitate the creation of new training organisations related to bioeconomy and circular economy.
- Interlink different regions to provide better learning opportunities as well as the exchange of good practices in the field of training.
- Provide training and opportunities to teachers, trainers and professors, which should be able to update their knowledge in close collaboration with the industries.
- Provide didactic resources to current educational institutions to improve students' competences acquisition.
- Collaborate to improve the training methodologies used in the current educational programmes in order to facilitate the acquisition of soft skills such as problem-solving, decision making, teamwork, creativity, analysis of complexity, etc..
- Facilitate bridges between different training levels, as well as provide modular courses in collaboration with current training organisations.
- Establish systems to facilitate the certification and recognition of competences and knowledge acquired in the workplace.

Regarding the organizational approach of BBECs, the participants in the study consider that these could work as **connectors between communication, education and industry and could play the role of synergic management of all these fragmented experiences**. The participation of different kind of stakeholders in its organisation should be also the **backbone to foster closely collaboration between stakeholders to facilitate workplace training**, more opportunities to do internships and validate the in-house training already provided by companies.

BBEC's should **promote lifelong learning, approximating science to society** and providing activities focused on different specific groups that could act as ambassadors to stimulate the society mindset change. This groups could be, among others, policy makers, communicators, school's administrators, companies managers, etc..

According to the results obtained through the survey, the stakeholders expect that BBEC will be a good structure to:

- facilitate the exchange of good practices between different regions
- strengthen the collaboration of companies and educational institutions through the design and execution of joint training projects
- facilitate the participation of the industry in the educational process (e.g., guest lectures, thesis, scholarships, internships, etc.)
- promote collaboration of companies and educational institutions to implement bioeconomy and circular economy joint innovation projects
- provide opportunities to teachers, professors and trainers to update their knowledge and competence regarding bioeconomy and circular economy
- monitor the dynamics of the bioeconomy and circular economy to identify the current and future competences needed in the sector
- provide train-the-trainer activities to update the pedagogical competences of teachers, professors and trainers in the bioeconomy and circular economy
- establish bridges between different levels of education and collaboration among training providers

The analysis of the results obtained through the survey related to the current situation, considering differences between different European Regions, show that:

- All the regions need to **raise awareness** about the bioeconomy and circular economy
- All the regions need to **identify which are going to be the main professional roles** in the field of bioeconomy and circular economy, however in the case of North Europe this item is less important.

- All the regions need to **increase the number of entities providing training** activities in the field of bioeconomy and circular economy, however in the case of North Europe it is less important than in the other ones.
- All the regions need to **improve bioeconomy and circular economy education** giving the students more opportunities to learn about the bio-based industry sector, especially in East Europe, and with less importance in North Europe.
- All regions need to **improve the methodologies used to teach** bioeconomy and circular economy to promote the acquisition and domain of soft skills (communication skills, teamwork, entrepreneurship, innovation mindset, etc.)
- All the regions should certify the competences acquired through the experience in the workplace, for professionals working in bio industries, especially in East Europe.

The analysis of the results obtained through the survey related to the desirable situation, considering differences between different European Regions, show that:

- BBEC should provide educational and vocational counselling services especially in East Europe, and to a lesser extent in the other regions.
- BBEC should facilitate the exchange of good practices between different regions. This is considered very important in all the regions.
- BBEC should strengthen the collaboration of companies and educational institutions through the design and execution of joint training projects in all the regions.
- BBEC should facilitate in all the regions the participation of the industry in the educational process (e.g., guest lectures, thesis, scholarships, internships, etc.)
- BBEC should promote in all the regions the collaboration of companies and educational institutions to implement bioeconomy and circular economy joint innovation projects
- BBEC should establish bridges between different levels of education and collaboration among training providers in all the regions, and especially in East Europe and Mediterranean Europe.
- BBEC should provide resources and training materials to educational institutions in all the regions but North Europe, where this output is less considered.
- BBEC should monitor the dynamics of the bioeconomy and circular economy to identify the current and future competences needed in the sector in all the regions, especially in East Europe and in less extent in Central Europe.



- BBEC should certify providers of bioeconomy and circular economy training to ensure they are aligned with real industry needs especially in East Europe. In the other regions this is something less needed, and it's not identified as a need in North Europe.
- BBEC should provide train-the-trainer activities to update the pedagogical competences of teachers, professors and trainers in the bioeconomy and circular economy, especially in East Europe, and is less needed in North Europe.
- BBEC should provide opportunities to teachers, professors and trainers to update their knowledge and competence regarding bioeconomy and circular economy in all the regions, but in North Europe this is less important than in the other regions.
- BBEC shouldn't have laboratories and other equipment to support R&D&I and the innovation-related activities of companies, since all the regions consider that this is not the most important thing to be implemented by them. The lowest punctuation was obtained in North Europe.
- BBEC should help companies in opening their doors to international cooperation specially in East Europe and North Europe, and in a lower position in the Mediterranean Europe and Central Europe.

Even though the number of responses obtained in the survey does not allow the application of inferential statistical tests, the results allow us to confirm that there are no notable differences between the different regions in most of the items considered in the survey.

It's important to highlight that the results of these report might be biased by the fact that most of the participants in the survey (57,3%) are from the academia, and 54% of them has a PhD as a maximum qualification level. In the case of focus groups, 51% of the participants has a PhD, however the distribution of the job positions was more equitable, since the distribution was University (28,6%), and the industry (23,5%) and others had experience from Public Administration (18,4%) and Education (15,3%).



Annex

ANNEX 1: Focus group template

BIObec

Preparing the creation of Bio-Based Education Centres to meet industry needs and boost the contribution of the bioeconomy to societal challenges

Task 1.2 European and regional analysis of the needs, opportunities and expectations

FOCUS GROUP INTERVIEW

General information

A **focus group interview** is a form of qualitative research in which a group of people are asked about their attitude towards a product, service, concept, idea, or project. Questions are asked in an interactive group setting (preferably a round table) where participants are free to talk with other group members. Focus groups provide researchers with initial ideas in the exploratory part of a study, they can be useful in the process of interpretation and evaluation of results and situations, and they can produce further research questions. Focus Groups are usually conducted with **6-9 participants and 2 moderators**. Regarding the participants, you should invite a diverse group with multiple backgrounds, a variety of experience and views on the topic should be present in the meeting.

Before the interview

Together with this template you should have received a brief ppt with information of the project prepared by SIE. You can share this information in advance with the participants. Furthermore, you can send them the questions in advance to let them think about the answers.

Each partner can decide to do a warm-up activity before the interview starts to facilitate the interaction between the stakeholders. A round presentation of all participants (name, organization, position and main experience) could be nice to let them know who is on the table.

Objective

The **main objective of the Focus Group** is to get information directly from the stakeholders in order to know their needs and expectations of the BBECs ecosystems. So that, we will get data in order to



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identify which are the opportunities of BBEC's in each context, and in the European context in general. The information we get from this process will be the basis to develop a survey that we will deliver at a pan-European level.

The specific project relevant information delivered by the focus group interviews can be described as follows:

- Information, which helps the consortium to define the characteristics of BBECs to satisfy stakeholders needs.
- Information, which supports BIObec project in understanding the opportunities of BBECs and the expectations of the stakeholders.
- Information that will be the basis for the development of other tasks such as T1.3, T1.4, T2.1, T2.2, T2.3 among others.

Language

The focus group can be held in English or in the national languages. If you do the interview in your national language you will need to translate the interview questions first. It is possible to take notes in the national language; the main results of the interview must be compiled in English.

Participants

Each partner should do one focus group interview with **at least 6 participants**. The focus group guide and questions are constructed in a way that you can invite different stakeholders at the same time. It is recommended not to have more than 9 participants in the table. It should be a diverse group with multiple backgrounds, and representatives from your region. All participants should have some experience with the topic to be able to participate in the discussion.

The focus interviews should include some of the following stakeholders:

- Representatives of Bioindustry associations, clusters, networks, etc.
- Representatives of Bioindustry industry companies at management levels or HR with knowledge on the profiles needed by the industry.
- Representatives from the Education sector, especially those involved in VET education.
- Experts from research and technology development centres.
- University staff involved in topics related to Bioindustry or Bioeconomy.
- Representatives of Administration

You can invite people from your own institution if they fit in one of the expected profiles. It is not recommended that someone already involved in the project participates in the activity as interviewee.

Moderation

It is recommended to have two moderators. One of them leads the group interview by initiating the discussion, asking the planned questions, and handing over to the next participant and by taking care of the time management. The second moderator takes notes and supports the first moderator (e.g., with additional questions or summing up if needed).

The **interview questions need to be followed** to ensure comparability of the results. It is not necessary to follow the same order, so that, the moderator can reorganize the questions according to the



interview members discussions. However, while allowing space for interaction, the moderator always needs to get back to the guideline and the questions.

The task of the moderators is to get the view from all different stakeholders regarding the different topics, but it doesn't mean asking one by one each question.

The moderators can sometimes simply raise the questions. In other cases, the discussion may be facilitated and enriched with examples, additional questions, etc. and the presentation of prepared input.

Notes/Recording of interview

It is strongly recommended, if possible and on agreement of the participants (**see consent form attached**), to record the focus group interview with a voice recorder or a similar tool. Further, it is essential to take notes during the focus group interview. You can afterwards transcribe the interview or use the recording to complement the notes you were taking during the interview, to check, if you missed some important details during the interview. Please use the attached template to summarize the answers.

FOCUS GROUP INTERVIEW

Introduce the project to the stakeholders participating in the focus group interview (attached you have some slides describing the project). As said during the KOM, this is a good opportunity to engage them in the project and involve them in future activities that might be of interest.

The questions are divided in sections that contemplate the main areas of interest to get information useful of the next tasks. It's important to get inputs about current situation, the desirable situation and the expectations of the stakeholders regarding BBECs.

The first section is important to warm-up the participants and set a common understanding of bioindustries before we start with more specific questions. You can start the interview letting the participants to shortly introduce themselves (company, who are they, how many years have they worked in the industry, what professional tasks they perform, what are their responsibilities, etc..) and explaining why it's important to involve all of them in this stage.

The general socio-economic-industrial context

- What will change in the industrial sector in the following 15-20 years? What are the leading trends and direction of development of the bioindustry?
 - What dysfunctions do you currently identify in the bioindustry sector?
 - What challenges do the bioindustry sector face for the future?
- Can you identify any network of collaboration between industries, universities, training centres and administrations in your context?

The bio industries in the Labour Market

- What will remain/change in the bio industry in the perspective of 2035?
- What effects will these changes have on the current model of the bioindustry and its human capital requirements?
 - What areas of professional performance / jobs / occupations will be maintained? What changes will be introduced?
 - What areas of professional performance / jobs / occupations will appear? Which functions will change?

Programs for vocational, academic and life-long-learning

- Do bioindustry workers currently have appropriate skills and training?
 - What is working well and what can be improved?
 - What training should workers in the bio industries have?
 - What would be essential, important and desirable?
- Where should this training be acquired (schools' settings or workplace settings)?
- How can we improve the current structure of educational programs in the biobased industries? Is it necessary to change the initial training? At which level?

Educational Centre Framework Design

- Which are the organizations providing training activities (formal and non-formal) in your specific context? Are they enough? Can you identify any innovative education centre in Bioeconomy?
- In which way can BBECs help to change the current structure of educational programs? Which might be the difficulties?
- How are companies in biobased sector providing training to their staff? Is it the best way? What might be different?
- Are there enough training providers in bio-based sector? Why?
- If you think there are not enough providers, what areas should be covered? At which educational level (secondary education, vocational training, bachelor, master, PhD...)?

Identification of potential certification scheme

- What are the rules for the certification of training in your specific context?
- Are there any specific systems to certify continuous training or workplace learning? If so, which type of competences / skills are certifying? Is it enough? If not, do you think they are necessary? Why?
- Which kind of collaboration between industries, Public Administrations, Universities, Educational institutions, etc. is needed to improve the competences' certification of workers and future workers in the bio industry?
- Do you think it's necessary to change the current system of competences certification? Why? If yes, who should be involved in the process of competences certification? Why?



BBEC organisational approach

- Are there any similar structures in your area related to bioindustry? Do you know any similar structures linked to other sectors of activity? Which ones?
- What kind of other services (not only training) might be provided by BBECs? Which are the target customers/stakeholders that would be interested in these services? Why?
- What stakeholders should collaborate or be involved to provide the described services? How should they be involved?



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CONSENT FORM

BIObec

Preparing the creation of Bio-Based Education Centres to meet industry needs and boost the contribution of the bioeconomy to societal challenges

Consent to participate in the Focus Group Interview as part of the BIObec project

The purpose of the Focus Group discussion and the nature of the questions have been explained to me.

I agree to take part in the focus group interview to share my knowledge, experience and ideas and I also consent to be tape-recorded during this focus group discussion.

My participation is voluntary. I understand that I am free to leave the group at any time.

None of my experiences or thoughts will be shared unless all identifying information is removed first. The information that I provide during the focus group will be grouped with answers from other people so that I will not be identified.

Name and Surname:

Organization:

Position:

Signature:

For statistical purposes

Age:

20-30 30-40 40-50 50-60 > 60

Gender:

Man Women _____

Maximum educational level:

Bachelor Postgraduate Master PhD |

Years of professional experience in the current position or similar:

< 5 6-10 11-20 21-30 > 30

Type of organization:



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Industry University Education Public Administration |

Size of your organization (number of employees)

<10 11-49 50-100 101-500 501-1000 > 1000



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REPORTING TEMPLATE

BIObec

Preparing the creation of Bio-Based Education Centres to meet industry needs and boost the contribution of the bioeconomy to societal challenges

Date and place of the focus

group:

Number of participants:

Language of the focus group:

Summary of the main information gathered

The general socio-economic-industrial context

- For each section it's important to clearly highlight the topics where the different stakeholders agree, and those topics where they have opposite opinions, mentioning the profile of those having different opinions.
- Each section should consider the current situation, the desirable situation and the expectations of the stakeholders regarding BBECs
- You can transcript any sentence that is relevant/important to understand the results. Do not forget to include the profile of the person saying the sentence.

The bio industries in the Labour Market



Programs for vocational, academic and life-long-learning
Educational Centre Framework Design
Identification of potential certification scheme
BPEC organisational approach

ANNEX 2: Survey template

BIObec

Preparing the creation of Bio-Based Education Centres to meet industry needs and boost the contribution of the bioeconomy to societal challenges

Task 1.2 European and regional analysis of the needs, opportunities and expectations

SURVEY

This survey is part of the project “BIObec - Preparing the creation of Bio-Based Education Centres (BBEC) to meet industry needs and boost the contribution of the bioeconomy to societal challenges (Grant Agreement 101023381)”, funded by the BBI-JU within the EU Horizon 2020 framework programme.

BIObec aims to build bridges between the bio-based industry and the education system by interlinking universities, innovation labs, and R&D centres with industrial actors and regions. In order to achieve this, the project proposes a holistic framework that merges the traditional perspective of an educational centre with the idea of a knowledge hub.

Before this survey, 19 focus group have been implemented across Europe, with the participation of 98 stakeholders from the industry, administration, educational organizations and universities that gave us a general framework about what BBEC should be.

The aim of this survey is to know which are the needs, opportunities, and expectations that you, as stakeholders, have regarding what BBEC should be. To do so, we kindly ask you to answer the following questions.

Note that we will analyse the data gathered from all the stakeholders together. This will provide a complete picture of the situation in your sector.

All the information provided will be treated statistically and anonymously. Completing the full survey takes around 10 minutes.

Previous questions:

I agree to participate in the research study. I understand the purpose and nature of this study and I am participating voluntarily. I understand that I can withdraw from the study at any time, without any penalty or consequences. (CHECK BOX (Yes / No))

SURVEY QUESTIONS

General Information:

Age: *(Open question)*

- < 20
- 21 – 30
- 31 – 40
- 41 – 50
- 51 – 60
- > 60

Gender: *(Multiple Choice)*

- Male
- Female
- Non-binary
- I rather not answer

Your highest level of Studies: *(Multiple Choice)*

- Primary Education
- Secondary Education / High School
- VET - Vocational Education and Training¹
- Bachelor/engineer (Undergraduate)
- Master
- PhD

You are participating as a

- Academic/researcher
- Company business organisation
- Educational Organisation
- Non-governmental organization
- Policy maker
- Public Administration
- Trade union
- Others

Your current country of residence: *(Multiple Choice)*

- Austria

¹ <https://www.cedefop.europa.eu/en/publications-and-resources/publications?search=Short+description>



- Belgium
- Bulgaria
- Croatia
- Czech Republic
- Denmark
- Estonia
- Finland
- France
- Germany
- Greece
- Hungary
- Ireland
- Italy
- Latvia
- Lithuania
- Luxembourg
- Malta
- Netherlands
- Norway
- Poland
- Portugal
- Republic of Cyprus
- Romania
- Slovakia
- Slovenia
- Spain
- Sweden
- Other...

BIObec questions

In my region, there is a need to raise awareness about the bioeconomy and circular economy

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

In my region, it's still necessary to identify which are going to be the main professional roles in the field of bioeconomy and circular economy

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree



- Agree
- Strongly Agree

In my region, the main educational levels where bioeconomy education and circular economy should be improved are... *(Multiple Choice)*

- Primary Education
- Secondary Education / High School
- VET Education
- Bachelor Education
- Master's Education
- PhD Education

In my region there are enough entities providing training activities in the field of bioeconomy and circular economy.

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

In my region there is a need to improve bioeconomy and circular economy education giving the students more opportunities to learn about the bio-based industry sector.

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

In my region there is a need to improve the methodologies used to teach bioeconomy and circular economy to promote the acquisition and domain of soft skills (communication skills, teamwork, entrepreneurship, innovation mindset, etc.)

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

In my region, it's necessary to certify the competences acquired through the experience in the workplace, for professionals working in bio industries

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree

- Agree
- Strongly Agree

In my region, we need to identify the professional roles that will have high demand in the bioeconomy and circular economy in the future

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

BBEC should provide educational and vocational counselling services.

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

BBEC should facilitate the exchange of good practices between different regions

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

BBEC should strengthen the collaboration of companies and educational institutions through the design and execution of joint training projects

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

BBEC should facilitate the participation of the industry in the educational process (e.g., guest lectures, thesis, scholarships, internships, etc.)

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

BBEC should promote collaboration of companies and educational institutions to implement bioeconomy and circular economy joint innovation projects.

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

BBEC should establish bridges between different levels of education and collaboration among training providers

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

BBEC should provide resources and training materials to educational institutions

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

BBEC should monitor the dynamics of the bioeconomy and circular economy to identify the current and future competences needed in the sector

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

BBEC should certify providers of bioeconomy and circular economy training to ensure they are aligned with real industry needs

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

BBEC should provide train-the-trainer activities to update the pedagogical competences of teachers, professors and trainers in the bioeconomy and circular economy

- Strongly Disagree



- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

BBEC should provide opportunities to teachers, professors and trainers to update their knowledge and competence regarding bioeconomy and circular economy

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

BBEC should have laboratories and other equipment to support R&D&I and the innovation-related activities of companies

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

BBEC should help companies in opening their doors to international cooperation

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

The main stakeholders that should be involved in the governance of BBEC are *(Multiple Choice)*

- Universities
- Research centres
- Companies
- Educational Organisations
- Non-governmental organizations
- Public Administration
- Trade union
- Others

Please, add any other aspect that you would like to highlight before the end of the Survey *(Open question)*



Please, provide your e-mail if you want to subscribe to the project's information updates on results and activities: *(Open question)*

Thank you for your collaboration!!



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ANNEX 3: Desk Research template

BIObec

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DESK RESEARCH

General information

During M1-M4, the needs, opportunities and expectations of the BBECs ecosystem will be identified via a desk work, reviewing literature and outputs of other EU initiatives (especially those from section 1.3.2 of BIObec proposal), collecting information from the project partners about recent experiences in bioeconomy education, especially by the European Bioeconomy University, and a survey with stakeholders and actors at local level.

Objective

The **main objective of Desk Research** is to get information about different documents, related to previous projects, national reports, international reports, bibliography, etc. that have already implemented research regarding the objectives of BIObec.

Some of the previous projects where the partners of BIObec participated are, among others: UrBIOfuture, ABBEE, BIOVOICES, BIOCHAIN, LIFT, Transition2BIO, GRACE, IBISBA, MpowerBIO, EuBioNet, BLOOM, BIOBRIDGES, RM@Schools, SmartplaCE@Schools, FOEBE, EBU Student Journey, BIOCEB, BIOEASTsUP, NEXTFOOD, European Bioeconomy University.



DESK RESEARCH TEMPLATE

BIObec

Preparing the creation of Bio-Based Education Centres to meet industry needs and boost the contribution of the bioeconomy to societal challenges

You should copy this structure for each document presented

Identification of the project Title / Website / Main Objective
Link to documents, if its available online If not, upload on TEAMS / WP1 / T1.2-Desk_Research. Specify the name of the file below
Brief summary of the project <i>(Objectives, context, methodology, main results) – The most important are the main results</i>



Identify which are the main conclusions of the project that related to BBECs needs, opportunities and expectations.

You should copy this structure for each project/document presented



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ANNEX 2: LIST OF PARTICIPANT'S ORGANIZATION

Participant's Organization
Aarhus University, biol. & Chemical Engineering
Abap, Ente di Formazione professionale
AgriKomp
Alianza por la FP dual
Apulia Region
Asmildkloster Academy of Agricultural Business
Association for Integration and Development
Association of Research Organisation
Austrian Centre of Industrial Biotechnology (acib GmbH)
BioBASE GmbH
BIOPRO
Ceipes
Center for Preclinical Research and Technology
Chemistry Sector Competence Council/ University of Agriculture in Krakow
Chimica Verde Bionet
Circular Bioeconomy Cluster Southwest
Cluster Agrifood FVG
CNR, cluster SPRING
CNR, Institute of Bioeconomy
Confindustria Puglia
Czech Technological Platform
Departament d'Educació - Catalan Regional Government
Department Agriculture Food & Marine



ecoplus - The business agency of Lower Austria
Ecosocial Forum Austria & Europe
ENAIP NET
Environmental Research Institute UCC
FBCD
FCBA
FIELDS Project, Università di Torino
Finnish Forest Industries Federation
Food & Biocluster.dk /Agro Business Park
Foundation Klaster LifeScience Cracow
Geco Gardens
Hedeselskabet
Heidelberg University
Höhere Bundeslehr- und Forschungsanstalt für Landwirtschaft Raumberg-Gumpenstein (Agricultural Research and Education Centre Raumberg-Gumpenstein)
IHE
Innovhub
Institut de Terrassa
Instituto Andaluz de Investigación y Formación Agraria, Pesquera, Alimentaria y de la Producción Ecológica (IFAPA)
IPGP
Ital Biotech
Joint Research Centre
Karlsruher Institut für Technologie (KIT)
Kompetenzzentrum Holz GmbH (WoodKplus) - Competence centre for wood
Laboratoris Ferrer



Marine Institute Ireland
Medical University of Warsaw
Mikrobiotech
Ministry of Agriculture CZ
Ministry of Education and Science
Natural Resources Institute Finland (Luke)
Oleofat
Polish Federation of Food Producers
Polish Federation of Food Producers Association of Employers/Food sector council of competence
RAGT
Regional Council of North Karelia
Secondary School of Chemistry in Brno
Sectoral Competence Councils, water and sewage management and environmental protection
SMEs, startups, students, solo entrepreneurs
SOLAS VEC
STATE COLLEGE OF APPLIED SCIENCES IN SKIERNIEWICE
TEAGASC
Tecnaro GmbH
Tecnova Technological center
TU Dublin
UAB's School of Biosciences
UCD & Biorbic
Umea University
Unitelma Sapienza
Università di Bari



Università di Teramo
Università di Torino
Universitat Pompeu Fabra
University of Eastern Finland
University of Natural Resources and Life Sciences, Vienna
University of Agriculture in Krakow
Viborg Municipality
Warsaw University of Life Sciences
Agriculture and Forestry Campus in Mirecourt
Interprofessional association FIBOIS Grand Est
DHDA association
ENSTIB (Higher National School of Wood Technologies and Industry)
Université de Lorraine, Department of entrepreneurship and socio-economical partnership
Office National des Forêts (ONF, French Forest)
Université de Lorraine, ENSAIA (École Nationale Supérieure d'Agronomie et des Industries Alimentaires de Nancy)
Université de Lorraine, ENSAIA (École Nationale Supérieure d'Agronomie et des Industries Alimentaires de Nancy)
Pole IAR (The French Bioeconomy cluster)
CEBB (Center for Biotechnology and Bioeconomy)
Coopérative Forêt et Bois de l'Est (https://www.foretsetboisdelest.com/)
Direction Régionale Grand Est de l'Agriculture, de l'Alimentation et de la Forêt
Maison de l'Emploi (Job center) et Mission Locale du Grand Nancy
National Assembly, representation of the 5th electoral division of Meurthe et Moselle