

H2020 Work Programme

D3.5. Overall exploitation and sustainability plan

Lead Contractor: Food and BioCluster Denmark

Author(s): Knud Tybirk, Jan Lund, FBCD, with key contributions from Lina Mayorga (UHOH), David Viaggi & Giacomo M. Rinaldi (UNIBO), Katri Rusanen (UEF), Damian Kuznowicz (Pro-Civis), and Fiona Scott-Hayward (MTU).

This document is the BBEC project (contract no. 101023381) corresponding to D 3.5 (M22) led by Food & BioCluster Denmark. This report aims to report on expectations for future BBECs, elaborated as a summary of results from Task 3.1-3.5 and the regional and pan-European workshops.

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.

Project details			
Project acronym	BBEC	Sept 2021/ Feb 2024	
Topic			
Type of Action		Coordinator: University Bologna	
Contact persons	Davide Viaggi, University of Bologna		
Website	https://BBEC.eu		

Deliverable details			
Number	3.5		
Title	Overall Exploitation and Sustainability Plan.		
Work Package	3		
Dissemination level	Public	Nature	
Due date (M)	22	Submission date (M)	23
Deliverable responsible	FBCD	Contact person	Knud Tybirk

Deliverable Contributors				
	Name	Organisation	Role / Title	E-mail
Deliverable leader	Knud Tybirk Jan Lund	Food & Bio Cluster	WP Lead	kt@foodbiocluster.dk
Contributing Author(s)	Lina Mayorga	University of Hohenheim		Lina.mayorgaduarte@uni-hohenheim.de
	Katri Rusanen	University Eastern Finland		katri.rusanen@uef.fi
	Damian Kuznowicz	Procivis		d.kuznowicz@procivis.org.pl
Reviewer(s)	Davide Viaggi	UNIBO	PM	davide.viaggi@unibo.it
	Antonio Hurtado	CTA		antonio.hurtado@corporaciontecnologica.com
Final review and quality approval	Davide Viaggi	UNIBO	PM	davide.viaggi@unibo.it

Document History			
Date	Version	Name	Changes
22/06/2023	1	BBEC D 3.5	

25/7/2023	2	BBEC D 3.5	Comments from reviewers
-----------	---	------------	-------------------------

Acronyms and abbreviations

BBEC	Bio-Based Education Centre
BMC	Business Model Canvas
DOA	Description of Action
IRWG	Implementation and Replication Working Group
T	Task
WP	Work Package

Partners and abbreviations

NAME	SHORT NAME
ALMA MATER STUDIORUM – UNIVERSITA DI BOLOGNA	UNIBO
UNIVERSITAET HOHENHEIM	UHOH
ITA-SUOMEN YLIOPISTO	UEF
IRISH BIOECONOMY FOUNDATION	IBF
MUNSTER TECHNOLOGICAL UNIVERSITY	MTU
FUNDACION CORPORACION TECNOLOGICA DE ANDALUCIA	CTA
CONSIGLIO NAZIONALE DELLE RICERCHE	CNR
FBCD AS	FBCD
INSITUT NATIONAL DES SCIENCES ET INDUSTRIES DU VIVANT ET DE L'ENVIRONNEMENT - AGROPARISTECH	APT
UNIVERSIDAD AUTONOMA DE BARCELONA	UAB
FUNDACJA EDUKACJI I DIALOGU SPOLECZNEGO PRO CIVIS	PRO-CIVIS
SUSTAINABLE INNOVATIONS EUROPE SL	SIE
STICHTING IHE DELFT INSTITUTE FOR WATER EDUCATION	IHE
WAGENINGEN UNIVERSITY	WU
FVA SAS DI LOUIS FERRINI & C.	FVA
UNIVERSITAET FUER BODENKULTUR WIEN	BOKU
INSTYTUT BADAN EDUKACYJNYCH	IBE
TRAKIYSKI UNIVERSITET	TRU
ZEMEDELSKY VYZKUM, SPOL SRO	ART

Table of content

Executive summary	5
Introduction and background	7
Methodology for the analysis	10
The Business model description used.	10
Multi-stage method	11
Analysis of elements of the six business plans.....	13
The market analysis.....	13
The marketing strategies	14
The governance.....	14
The economic and financial sustainability	16
Activities and resources.....	17
Risk assessments	20
Preliminary conclusions on sustainability and exploitation	22
Bibliography	23
ANNEX 1. THE SIX BBECs IN SHORT.....	24
The Mediterranean BBEC	24
The Finnish BBEC.....	33
The Central European BBEC	39
The Irish BBEC.....	46
The Danish BBEC	53
The German BBEC	59



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.

Executive summary

The EU's Bioeconomy Strategy updated in 2018 has a focus on the development of competencies to strengthen European competitiveness and create jobs. Education and training providers are to deliver skills to unfold the economic value within the bioeconomy. For this reason, the project BIOBEC has been working to prepare for the establishment of six biobased education centres/hubs within the EU.

This report summarizes some of the steps taken in WP 2 and WP 3 to gather info and to organize the processes and stakeholders locally. The objective is to develop an Exploitation and Sustainability Plan building on the initial Business Model Canvas in WP 2 and the outcome of task 3.3 (the economic models) for their long-term viability. The intention was to follow a strict common methodology, but we have experienced that the educational systems and the traditions for cooperation, financing and governance vary considerably, and therefore, the development of locally adapted BBECs have followed six local strategies to pursue the common goals.

This report builds on the Business canvas models formulated in WP 2 and the parallel work in D 3.2 on the Governance of the centres, D 3.3 on the financial models and budgets of the BBECs and D 3.4 on the foreseen activities of the BBECs.

None of the BBECs have started yet and this feasibility study shows promising opportunities, but also pinpoint the challenges ahead towards the BBECs. All have uncertainties concerning income generation, as the BBEC concept has not been tried before.

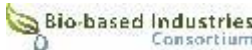
We compare the market analysis and the marketing strategies in the six regions. The interest is there, and we hope that the willingness of the biobased sector to pay for lifelong learning is there to stay competitive and develop new jobs. But this will not happen without strong and visible commitment by the involved institutions, a focused marketing action and networking with the relevant institutions and potential customers. The analysis of the economic and financial viability of the centres shows varying degrees of optimism and has opened the eyes for more preparatory work to make the BBECs economically sustainable.

This is a broad variety of activities and suggested specific courses to be developed across traditional silos and sectors and we expect to cooperate closely with traditional educational institutions to fill in the gaps and prepare the workforce (and existing teachers) with new competencies needed in the Bioeconomy.

The plans for the organisation and the governance of the six BBECs are in most cases to start a new organisation as a project or a hub in a BBEC partner organisation and from there developing into an independent organisation as the business model becomes clearer and more sustainable. In other cases, the BBECs are expected to start a new organisation with external funding. In all cases, a broad steering/advisory board is foreseen as this is very dependent on close networking with the industry.

Based on the work so far, we expect that 'real' BBECs will be started during the next 1-2 years. We see the BBEC project as a transnational feasibility study and very valuable

contacts and experiences have been shared across countries. Only the future can show and document whether the planned BBECs are sustainable in the local realities. A conclusion from this is that the project has experienced that we need locally adapted BBEC hubs, to be able to become realized in the near future.



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.

Introduction and background

Bioeconomy should be seen as the transition from a linear economic model based on non-renewable energy to a circular, low-carbon economy that relies heavily on the production and consumption of renewable, organic-based resources (Patermann and Aguilar 2018, Paris et al., 2023). The EU's Bioeconomy Strategy adopted in 2012 and updated in 2018 pursues five objectives: (I) ensure food and nutrition security, (II) manage natural resources sustainably, (III) reduce dependence on non-renewable resources, (IV) mitigate and adapt to climate change and (V) strengthen European competitiveness and create jobs (Papadopoulou et al., 2022).

Education and training providers are to deliver skills to unfold the economic value within the bioeconomy. At the same time, they should contribute to the realisation of the ambitions specified in the European Green Deal and the EU Bioeconomy Strategy. The EU Commission has recently published a comprehensive report on the Promotion of education, training and skills in the bioeconomy where unmet training needs that need to be addressed to realise the opportunities that the bioeconomy can provide in the future are listed.

However, identifying the current and future skill needs of the bioeconomy is far from straightforward as skills demand can be measured in different ways. The European Qualifications Framework (EQF) can be used to frame different educational levels. In a recent review of the current practices of bioeconomy education and training in the EU (Paris et al., 2023) it is concluded that education approaches attached to the subject of the bioeconomy vary considerably across the EU, with a range of academic, practical, hybrid, short-term and other approaches and that more bioeconomy education programs are required, especially focused on specific bioeconomy themes.

This change towards a sustainable bioeconomy is not an easy task. It requires both a change of understanding of how food production is carried out among the population in general and a practical transformation of the skills required for the creation of new types of employment. Also, the employees in agri-, food- and forestry sectors should rethink their role as key actors in the bioeconomy, an important sector for the future sustainability of the European economy.

This indeed requires a new and innovative view of the educational systems and the skills needed to become an active part of the bioeconomy. To implement an effective medium to long-term strategy for bioeconomy development and scaling up, bioeconomy education must span the full education lifecycle from primary school students to further, higher and postgraduate education as well as vocational training. Vocational training needs to evolve to match requirements for skills in primary production, manufacture, transport, and other relevant sectors for both specializations after secondary education and for mid-career professionals. Furthermore, workers need to update their skills and competencies to respond to job market evolutions through appropriate life-long learning programmes. Practical training at companies is of growing importance to allow students to start creating relations with industry early in their career. Traditional silo education may not fulfil the needs for cross-sectorial skills

and understanding, and a mix of theoretical and practical ways of acquiring the needed skills should have more focus.

The overall issue goes far beyond defining skills but rather spans into organisational, financial and implementation approaches of education and training initiatives.

This present work is based on the knowledge and experience accumulated during the execution of the project "Preparing the creation of Bio-Based Education Centres to meet industry needs and boost the contribution of the bioeconomy to societal challenges (BBEC)". The project has the goal of developing a holistic framework for multi-level Bio-Based Education Centres (BBECs) to address the present and future needs of the industry and the surrounding ecosystem at local, regional, national and/or international levels.

This report from Task 3.5 summarizes some of the steps taken in WP 2 and WP 3 to gather info and organize the processes and stakeholders locally. The objective is to develop an Exploitation and Sustainability Plan building on the initial Business Model Canvas in WP 2 and the outcome of task 3.3 (the economic models) for their long-term viability. The work in WP 3 has the overall aim of providing governance plans, learning programs and feasibility assessment of the proposed BBEC (objective 3) of the project to assess the overall sustainability of the designed centres. This has been done through the design of a consistent plan for the assessment of governance solutions (D 3.1) followed by three parallel tasks to a) Specify plans for the governance structure of the BBEC, b) Provide an economic analysis of the feasibility of centres, including a detailed screening of potential funding sources and models and c) to specify plans for life-long-learning programs for the existing workforce.

Simultaneously, we will in this report summarize and analyse the strengths and weaknesses of the business plans for the six regions to give an overall assessment of the exploitability and sustainability plan for the existence after the project lifetime. The task will thus collate the results of WP2 and the experiences of planning the centres, based on feedback collected in each BBEC from tasks 3.1-3.4.

Basically, the idea of D 3.1 was to guarantee consistency of the six BBECs and a common way to work in parallel. Consistency has been reached, but from very diverse points of departure and the business plans developed in the six regions vary considerably depending on the scope and the local needs and opportunities. The preliminary business plans (Annex 1) for the six BBECs will be presented to partners and the advisory board in Ireland ultimo June 2023 and will give input for the D 3.6 reporting on the stakeholder workshop and summarize the conclusions of WP 3.

This in turn will give input to the roll-out strategy and a roadmap in WP 4 for coordinating the replication of BBECs at the European and international levels, fostering the exploitation and collaboration of the outcomes (objective 4 of the project).

Considering the mission and the vision of the different BBECs, we can summarize them as follows (from D 3.2):

Mission

The BBECs function as knowledge exchange and education hubs, promoting cooperation and service provision in the field of bioeconomy. They aim to connect actors, develop flexible frameworks, make education accessible, turn challenges into a profitable business, deliver outstanding education, and match training demand in specific regions.

Vision

The BBECs aim to serve as hubs for bioeconomy development, innovation, and investment in their respective regions. They envision being catalysts for sustainable education, bridging gaps, pioneering green circular bioeconomy, achieving excellence, and becoming reference points in their areas of focus.

Overall, the BBECs aim to promote bioeconomy education, bridge the gap between industry and education, and foster collaboration and innovation in the bioeconomy sector.

Methodology for the analysis

The deeper analysis of the three main aspects of the business plans, i.e., the governance (Task 3.2), the financial part (Task 3.3) and the plans for activities and learning programs (Task 3.4) have given the basis for this analysis.

A focal point for the overall project is the co-creation process. To ensure its implementation, an important moment was the consortium meeting in Seville in January 2023 (M17) and the meeting in Tralee including members of the advisory board (M 22).

Thus, this cross-cutting of previous tasks – has resulted in the complete or 'natural' /coherent description - of the six BBECs business models. In Annex 1 the first presentation of these individual business plans (in short) as the BBEC should be pitched for an investor are presented – as a further elaboration from the BMC presented in D 2.2.

The work in the parallel 'sub-analysis' on the three main aspects should here be compared with the initial Business Model Canvas and have a focus on the economic and financial sustainability of the centres. After all, if the economic analysis in Task 3.3 does not show good perspectives or a positive economic outcome, the BBEC will not be established or survive in the longer run. The same can be said about governance, activities, and marketing, and thus we go through some of the major factors in this report.

In this task, we have worked from the Business Model Canvas developed in WP 2. But we have asked the six BBECs to re-formulate the business plans in a slightly different form, but still elaborating from the Business Model Canvas (Osterwalder and Pigneur Y. 2010).

The further development of these draft business plans was to present them at the stakeholder workshop in late June 2023 and after that, the six plans will be adjusted to the next phase with a roadmap for implementation (WP 4).

Details of the process and the interaction with stakeholders throughout WP3, in particular concerning the final stakeholder workshop, are provided in D3.6: Report on the WP3 Stakeholder workshop.

The Business model description used.

We have asked the six BBECs to describe their BBEC using the template below and the result can be seen in Annex 1. The template is derived from and elaborated a bit on the headlines of the Business Model Canvas (BMC) from WP 2 to fit it to the description of six BBECs. The BMC is a 'one-pager' not allowing many details and here we wanted to present a more elaborated business plan for each case allowing to elaborate more on the market analysis, the planned activities, the cost/revenue, the external financing sources as well as the governance models to include the work of Task 3.2, 3.3 and 3.4.

Executive Summary

A brief overview of the BBEC, including its mission, target market, services, and goals.

Market Analysis

A short analysis of the target market, including size, needs, and trends.

Value Proposition

A clear statement of the unique value the specific BBEC offers to customers, including its services and benefits for its customers.

Marketing Strategy

A plan for reaching and attracting customers, including advertising, social media, events, and other promotional tactics.

Revenue Streams

A description of the major revenue streams BBEC will have, such as tuition fees, grants, sponsorships, or donations. (From WP3.3)

Cost Structure

A breakdown of the costs involved in running the BBEC, including expenses related to facilities, personnel, marketing, and operations. (From WP3.3)

Financial Projections

A financial plan that includes revenue and expense forecasts, cash flow projections, and break-even analysis.

Key Activities

A description of the main activities and processes involved in delivering the services, such as courses /curriculum development and student enrolment.

Key Resources

An overview of the resources required to operate the BBEC, including personnel, facilities, equipment, labs and technology.

Partnerships and Alliances

A description of the partnerships and alliances the BBEC will form with other organizations, such as academic institutions, industry associations, or community groups.

Legal and Regulatory Environment

A review of the legal and regulatory environment that affects BBEC, including licenses, permits, and compliance requirements.

Governance

How is the BBEC being governed?

Risk Assessment

An evaluation of the potential risks and challenges the BBEC may face, such as competition, funding, or student retention.

Multi-stage method

The sustainability assessment was initially envisaged as building on a Delphi process according to DoA. At the stage of the project where task 3.5 was implemented this showed immediately to be not an effective option. Indeed, IRWG members and other local stakeholders were in connection with the project team and among themselves and were already deeply involved in the discussion about the centre's design. Based on this, it was considered more effective to include the discussion about sustainability in the ongoing interactions at the country level and then to provide a synthesis by the

centres to be shared and discussed at the final WP3 workshop in Tralee in June 2023, replicating the envisaged process but more flexibly and qualitatively.

The working methodology at the centre level was somewhat different in the regions, depending on the needs. Thus, we had to adapt the foreseen methodology to develop the business plans, and all partners have used to most flexible and well-adapted methodology to reach the business plans in Annex 1. Also, the sustainability discussion required different approaches and built on different issues depending on local context, level of maturity and main sectors addressed.

Building upon the drafted Business Canvas Models from WP 2 the two common steps we have taken as a consortium was a workshop during the project meeting in Seville, January 2023 to align the ideas and to a certain extent the processes. However, local factors have played an important role and the various consultancies with the IRWG and other stakeholders had to follow a local logic. In Italy, three IRWG meetings were held in a multi-stage process.

In Denmark, for instance, a local workshop was held in January 2023 followed by individual consultancies meeting with the educational institutions and other stakeholders around the IRWG. This has given key inputs to the business plan and after the project meeting in Tralee, Ireland, the Danish stakeholders will meet again and discuss the steps ahead for financing, co-creation of courses etc.

In other regions, the process has been simpler, where a university has decided to lead the formation of the BBEC, like in Finland and Germany. The process has also been complicated in other cases where two or more countries have been involved (Mediterranean and Eastern Europe).

A synthesis of the lessons learned on sustainability was provided at the stakeholder workshop in late June 2023, where also IRWG and Advisory board members were invited. The discussion, besides the presentation and comparison of business plans, was focused on the potential for implementation and the likely status of the centres in 1 to 5 years, to address the sustainability issues from a practical perspective.

Analysis of elements of the six business plans

As mentioned, the revenue, the costs and the financial projections are key in the overall evaluation, and these have been analysed and compared in D 3.3. Furthermore, the Governance structures have been analysed in D 3.2 and the BBEC activities and plans have been analysed in D 3.4.

The market analysis

The analysis of the market for educational needs and services in the six regions varies considerably, for instance, due to the difference in how explicitly the governments have formulated a strategy and an action plan for the Bioeconomy. The BBEC project was born out of a general need in the bioeconomy industry to increase competencies and develop new education for the bioeconomy workforce.

Most of the involved countries have – or are developing - a Bioeconomy strategy, except for Denmark, where only a Bioeconomy panel has been established so far. Here, a series of interviews with educational institutions have been carried out and the need for life-long educational courses has been clarified. Bioeconomy strategies typically have aspects of education as part of the strategy.

According to the report Promoting education, training, and skills across the bioeconomy (Graaf et al. 2022), Germany has a total of 168 educational programmes in higher education institutions linked to the bioeconomy. Regarding VET, there are offers for topics on: Agriculture; manufacture of bio-based chemicals; pharmaceuticals, plastics and rubber; manufacture of bio-based textiles; food, beverages and tobacco; and energy, water and waste management. These educational institutions are potential stakeholders for the successful dissemination of the planned activities.

For the Central and Eastern European (CEE) countries the BioEast initiative work for shared strategic research and innovation framework for working towards a sustainable bioeconomy in the region. In Finland, the analysis has shown the need to develop a forest-based bioeconomy and to adapt education in this direction. In Ireland, reports show that there is still a lack of broad public, community and industry understanding and awareness of the bioeconomy opportunities.

These national/regional strategies have a more or less explicit analysis of needs for qualified workforces and thus for 'skills gaps' and educational needs. However, the same plan for filling in the skills gaps is still to be carried out in e.g., Ireland. And even more so the identified gap in the educational system becomes evident, so in all BBECs a more thorough analysis of the educational needs will be explored, when the BBECs have been established.

In the Mediterranean region, it is not easy to establish the overview and the size of the market for biobased educational activities, but apparently, it is quite limited due to many reasons (see Annex 1).

The marketing strategies

Although the needs may be more or less clear or clearly expected it is also expected to be a costly and time-consuming task:

- a) to define and describe the courses and
- b) to market these at the edge of the 'Red Ocean' as something new, innovative and for future farmers/ workers who want to be associated with bioeconomy, modern technologies and sustainable – or even regenerative - crop production.

The new courses /educational offering should point to the Blue Ocean as something new for the ones who are not satisfied with a standard education or who is curious on what's in the Blue Ocean.

The marketing work is described in varying degree in the Annex, but will often require a website, info-days, networking events in combination with SoMe where the young or adults are. The BBECs must identify the hot 'niches' in education and replace 'green farming' with chief bioeconomic operators/ engineers of the biobased future etc.

Public relations should start with the current network and visibility activities in the homepage, newsletter of the educational institutions but also social media channels of the university, of the BBEC and stakeholders. Also networking with stakeholders at demonstrations, chambers of commerce, fairs, educational og and bioeconomic conferences should be part of the marketing strategy.

The governance

The governance plans consider objectives related to the training and education activities that they should implement, the development of plans of different natures, and the implementation of singular and innovative projects that are necessary for the improvement of bioeconomy and bioeconomy education in its region of influence. The BBECs aim is to create synergies and collaborate with current institutions of the territories, not to compete with them, but to be complementary to the activities they are already doing.

Below is a summary of the main information provided in the BBECs' governance plans (from D 3.2):

CENTRAL-EASTERN BBEC

The Central European BBEC will be guided by a Steering Group responsible for annual planning. The plan will be monitored through regular meetings and reporting, using established Key Performance Indicators (KPIs). Flexibility will be maintained to adapt to market developments and deepen cooperation. Communication with external networks and partners, such as BIOEAST and thematic working groups, is vital for knowledge transfer and international collaboration. The goal is to become a significant player in the bioeconomy ecosystem of the macro-region.

GERMAN BBEC

The German BBEC conducts its annual planning through a team meeting led by the BBEC coordinator. The planning process involves reviewing the previous year's objectives, strategic milestones, and project updates. The BBEC maintains close links with external stakeholders through project activities. Improvement and innovation

plans are developed based on ongoing feedback and market trends. Networking with other institutions is a shared responsibility, with the BBEC coordinator facilitating stakeholder engagement, cooperation, and product development.

DANISH BBEC

The Danish BBEC daily management includes annual (and longer-term) planning with all the involved institutions and companies. The definition of the role of the CEO and cooperation with the close stakeholders is key to success. The participating educational institutions and other stakeholders will develop this common hub/platform for biobased education, the balance between the BIOBEC (marketing the courses, attracting customers) and the 'real educators' should be found. A cooperation model for the BioBEC hub and the institutions will be developed, but this is yet to be discussed with the stakeholders/educational institutions.

FINNISH BBEC

The Finnish BBEC follows an annual planning process coordinated by the platform coordinator, with guidance from the steering group. The plan is developed in collaboration with key actor organizations and is regularly updated. The steering group evaluates the plan before its establishment and assesses its execution at the end of the operating year. Marketing efforts are conducted through the platform and social media channels, with events organised to engage specific customer groups. Networking with other institutions and stakeholders is actively pursued to enhance collaboration and development.

IRISH BBEC

The Irish BBEC's annual planning will involve collaboration between the operations and project teams, with input from the governance team. The Performance Management and Development System (PDMS) will be utilised to set goals, review performance, and enhance staff performance. Key Performance Indicators (KPIs) will be established and regularly updated through meetings between coordinators and board members. Events like Bioeconomy Ireland Week, conferences, and educational programs will be promoted through various channels. An annual calendar of events will be planned in September or October each year, featuring recurring events such as Bioeconomy Week and educational registrations.

MEDITERRANEAN BBEC

The Mediterranean BBEC is carry an annual plan according to the legal form. Monitoring of plans and programs, as well as evaluation and accountability, will also follow the legal form. The adoption of a quality assurance system and relevant certifications will be related to the results of WP4. Improvement and innovation plans will be developed and implemented. Institutional marketing and networking with other institutions will be carried out, including partner institutions and a network of former students and users.

The overall conclusion is that the governance plan should be adapted to the context and the legal form of the BBEC, and this legal form should be always the one that better fits to the regulations and the activities that will be performed by the BBEC. The bigger the region where the BBEC should act, the bigger the challenges to identify which should be the mission and objectives of the Centre.

The economic and financial sustainability

The intention of the BBEC project is to perform a comparative analysis and assessment of six individual budgets and plans for additional funding resources from each of the six BBECs. Each budget contains information about investments, capital expenditures (CAPEX), operating expenses (OPEX), and revenues. The method used aims to identify similarities, differences, and trends across the budgets, enabling an assessment of their financial performance and viability, but a scientifically strict and formal comparison has been hampered by the rather different situations and goals of the BBECs.

Data from individual budgets provided was standardized into different accounts in D 3.3 to ensure consistency and comparability. The data was categorized in the work of summarizing different aspects of budgets. Data from the different BBECs were put into tables for comparison needs.

To evaluate the six BBECs during their initial five years, the budgets in D 3.3 have been consolidated for years 1-5. In cases where a five-year plan was not available, years 2 or 3 are considered representative of the subsequent years.

Various models for establishing the BBEC exist in different geographic regions. Most of these models primarily involve investments in concept development, organizational infrastructure, and the creation of a web platform or website. The **necessary investments** for the start are incorporated in the Capex of year one is varying between 15.000 and 245.000 € reflecting the different starting points and goals of the BBECs.

Also, the **sources of revenue across** the BBECs are diverse and exhibit significant variations. In particular, the Eastern Europe BBEC relies heavily on funds obtained through various EU projects, whereas other centres have a more evenly distributed revenue profile. The Finnish BBEC has no planned revenue as the hub is going to be part of the Eastern Finland University and has public funding as part of the University budget, not considered as a BBEC revenue stream here.

The majority of BBECs generate revenue through participant payments, which contribute to their overall revenue stream. Also, in three cases revenue is derived from partners paying a membership fee to access the BBEC online and other services. However, the revenue from selling courses is relatively small since this aspect predominantly occurs at the partner level and is therefore included in their respective revenue.

Across all partners, the management/staff component constitutes the largest portion of **operating expenses (OPEX)** as it plays a crucial role in overseeing and facilitating activities within the centres. The significant variability in management costs can be attributed to the diverse approaches employed in organizing the work within each partner's centre. The teaching aspect in most of the centres is primary based on activities where Universities and different associated partners are performing the teaching at courses.

The centres have not allocated a specific budget for housing offices within their current facilities, as it is anticipated that they will be established within existing environments at universities and clusters. Nevertheless, the Danish and Eastern European centres have included these expenses as part of their overall "Institutional capacity costs."

Administrative costs are mostly encountered within the management budgets or as part of "Institutional capacity costs", which enables the organizations to use existing resources to handle administrative roles. Costs for marketing again reflect the local needs and all BBEC have costs associated with travels, catering etc. for courses.

Activities and resources

It is clear from D 3.4 that the different interpretations of the concept of "knowledge hub", that underlies the project, reflect different ways to establish a BBEC, so everyone interested in replicating the plans and programs for education and training in the bioeconomy can draw on a wide range of solutions and opportunities.

All BBECs will work all year, i.e., full-time centres, some with and some without summer schools. Typically, the BBECs will offer courses and training in the national languages, but also international courses and exchange of staff cross-borders can be a tool in many cases. The stakeholders, including the IRWG, will be involved in the processes in different ways according to local needs. New networks will be formed to discuss the educational needs and to fill in these gaps with innovative cross-silo courses to qualify the workforce for specialized jobs within the bioeconomy.

Almost all the BBECs stated that they will target vocational education and training (VET), lifelong learning (LLL), academia and entrepreneurship training (i.e., mainly levels 2-6 of the European Qualification Framework (see Figure 1)). However, the Mediterranean BBEC, will not provide entrepreneurship training in the first phase. To a varying degree concepts such as 'on-the-job-training, internships, exchange of students/jobs etc. are part of the BBECs and often it is stated that it should also be practical/hands-on education, becoming part of real bioeconomy industry realities (from farming to high-level bioeconomic cascading and processing industry).

The activities proposed to represent the result of

- the regional/national context (needs, expectations, and opportunities), and
- the expertise of partners and stakeholders involved in each BBEC.

It can be concluded from D 3.4 that a national vision for these Centres may be the best solution, at least for the educational activities, rather than a pan-European concept. However, this does not mean the BBECs should not have an international vision and a strong European network. On the contrary, from the description of activities emerges a high number of similarities, such as the communication and dissemination purpose or the will to provide introductory courses on the bioeconomy, that testify to the importance of central European coordination of the regional/national BBECs to optimize resources, opportunities, and strengths.

The model of BBEC that emerges from Task 3.4 is a centre that has a transversal vision of the European and national contexts (sources of inputs), and a deep country-based educational offer (sink of outputs).

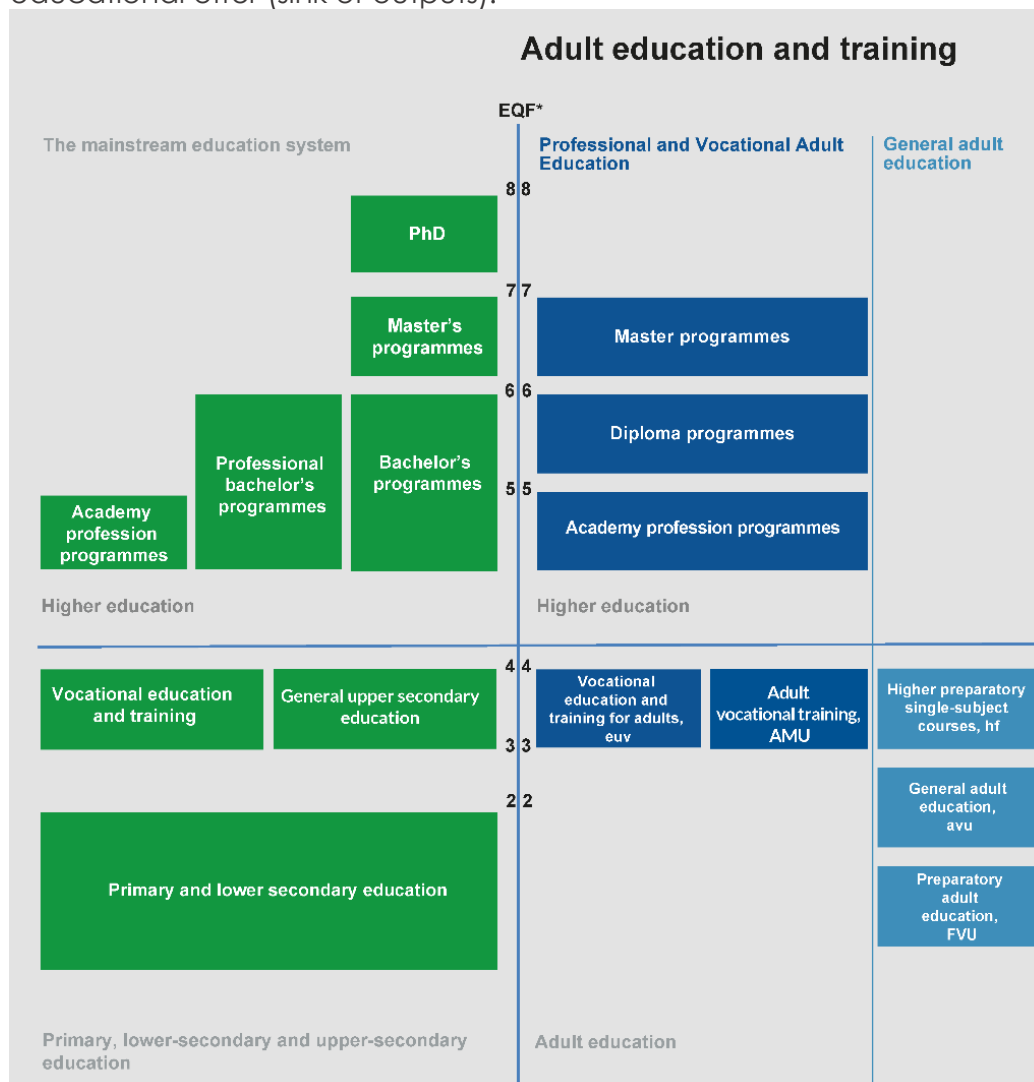


Figure 1 European Qualification Framework for adult education and training in a Danish context

The foreseen activities of the BBECs varies considerably depending on the institutional framework.

The following themes have emerged, but also with indication of large flexibility and creativity in the process of developing new – yet undescribed- courses.

- Primary production systems – agriculture, forestry, aquaculture, including waste and side-streams.
- Food, feed, fibres, and bio-based industries.
- Fuels and bioenergy.
- Sea, oceans, and waters.

A certain degree of specialization is expected on the themes – based of the expertise and local needs in each region. Some Centres might naturally have more emphasis

on marine biomasses, grass, forestry, or livestock production in the local understanding of bioeconomy.

Often there is an element of coordination or development of new courses in cooperation or co-creation of courses or educations with existing educational institutions. In Finland, quite specific new bachelor level courses will be the result with a focus on bioeconomy in forestry and 'sustainable forest-based bioeconomy' for teachers. The BBECs will develop courses covering most of the themes in the Bioeconomy (Figure 2).

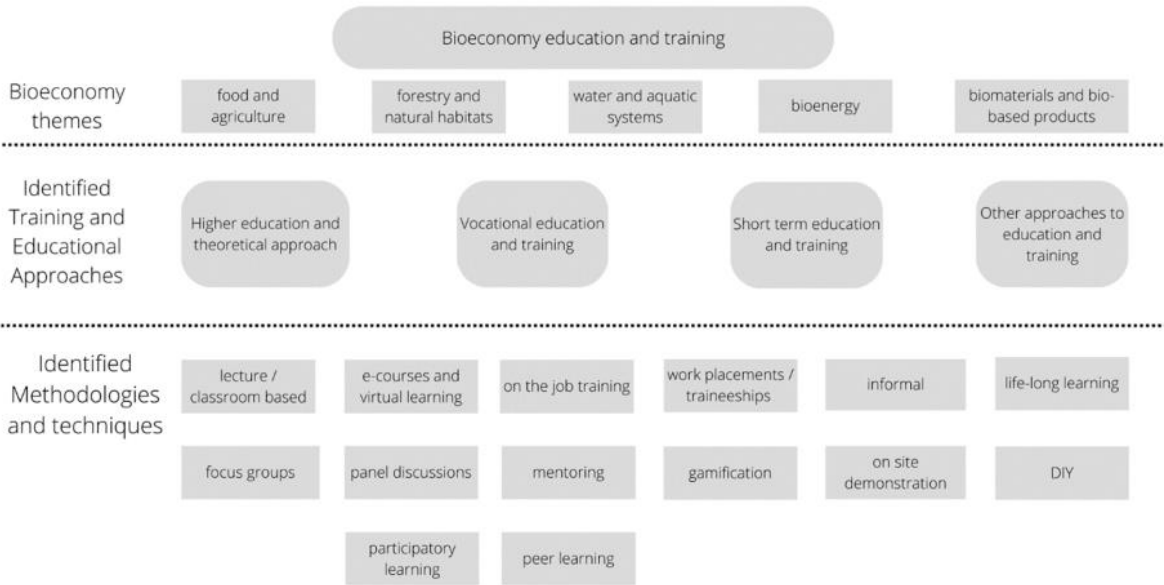


Figure 2. Conceptual Bioeconomy educational approaches (from Paris et al. 2023)

In Germany, for example, a list of academic and non-academic activities is presented – e.g., some for farmers, for kids, some at master-level and some with developed connections to industry and on-line courses in bioeconomy.

In the Mediterranean BBEC experimental and workplace learning activities are introduced as well as general communication of /courses on what bioeconomy is. In Denmark, the BBEC core is to develop new interacting and cross-cutting courses and try these out marketing-wise and content-wise on the first generation of students and use these innovative courses to establish international cooperation and exchange of students and Bioeconomy 'on-the-job-training' Furthermore, bioeconomy incubation at existing bioeconomy centres will be part of it.

In some cases (BBEC in Central/East) will also develop educational materials and in all cases, there will be a strong focus on marketing the new courses/educations. All 6 BBECs have ambitious goals and aim to enlarge their mission through many activities that go beyond the scope of an education centre.



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.

Risk assessments

The own risk assessments (in Appendix 1) of the BBECs also differs. Some are rather explicit others less and below we summarize some of the raised concerns and potential solutions.

Funding

In the German and Finnish case there is already a university commitment to establish and fund the BBECs, so the backbone of the financing is ready. In the cases where part of the input is in-kind contributions it might seem easier but requires a lot of networking and follow-up on the activities for continuous support.

Generally, there are funds available to work with the area from EU, national funds, private funds), but for a specific BBEC it is a risky strategy on its own. EU funding will be pursued in some cases, but this is highly unreliable. External funds can be used as a starting point when the purpose of the first years also is to develop a viable financial model to continue the BBEC. Lobbying of relevant bodies is essential.

Cooperation with other BBECs – that is the internationalization aspects - will need additional funding – either from projects or from a very attractive course where learners will travel and pay by themselves – or their employers will pay.

Revenues and OPEX

The picture is rather uneven among the six. Some consider commercial services by the BBEC, others co-creation and testing of new courses. In some countries (Denmark) general education is free, whereas lifelong learning typically is paid by the employer. This differs very much from region to region and requires local models.

Students

Some BBECs are concerned about the recruitment of 'students', is it attractive what we can offer? Are we timely enough to match the needs of the industry? This cannot be answered without a try for a couple of years. Cross-country centres have different needs and traditions (and languages) giving a special challenge.

The promotion and visibility of the BBEC activities must be very strong for achieving success. Will the relevant industry and primary production see themselves as 'actors in the bioeconomy'? The industry says they need competent and skilled employees, but will they actually pay to upgrade them to stay competitive? One BBEC suggests that bioeconomic certification as a basic 'green education' should become a standard – maybe at the EU level?

Competition

Impossible to find a suitable leader/Coordinator/CEO (a hybrid between business and bioeconomy very talented in establishing relations, networks, and communication) that can mobilize and cooperate with the relevant educational institutions? This is a challenging job and should be full-time – at least in the initial period.

In the cases where the BBEC is part of the university, the dissemination and communication activities – as well as reaching the industry - could be difficult.

When new courses are supposed to fill in gaps between existing educational silos – ideally, there should be no competition, but a suggestion is to embrace and include 'potential competitors' in the BBEC – e.g., forestry and water circulation.



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.

Preliminary conclusions on sustainability and exploitation

The work in WP 3 has the overall aim of providing governance plans, learning programs and feasibility assessment of proposed BBEC (objective 3) of the project to assess the overall sustainability of the designed centres. The working methodology used has been adapted to the regions, depending on the needs. This report will be followed by a report summarizing the major conclusions from the stakeholder workshop.

We have realized that local differences create different processes and results. Among other things, due to different understandings of 'Knowledge Hub' and of bioeconomy, but especially due to different educational systems and different financial opportunities (private/public). The partners responsible for the BBECs have different starting points (academic, vocational, clusters etc.) and this also will make a difference.

A conclusion from this is that the project has experienced that we need locally adapted BBEC hubs, rather than 'standardized European Hubs'. Similar to flexibility to context, flexibility to the market development and policy agenda is also needed over time, which implies that BBECs have to be expected to develop dynamically.

Based on the serious work so far, we indeed expect that 'real' BBECs will be started during the next 1-2 years. We see the BBEC project as a transnational feasibility study and very valuable contacts and experiences have been shared across countries.

The local processes in the project have ignited a small spark that has to be nourished with more local/national and private funding to start a local fire. Hopefully, the contents of the BBECs will evolve further during the last part of the project and afterwards, perhaps even resulting in a 'bushfire' - that will ignite more BBECs in the future.

The hottest dream – and this project has shown some of the potentials – is that this cross-silo and cross-country hubs can qualify the biobased sectors support and the industry, creating new opportunities in the biobased circular economy.

In order to be helpful in the process, the exercise carried out in the WP needs to be used being aware of limitations. While we claim that the info produced about governance plans, economic feasibility, learning programs and overall sustainability provides realistic estimates, this can only be regarded as a basis for the actual implementation process that will require further specification and potentially important deviations.

Bibliography

- D 2.2 Report on Regional BBEC Business Models and Governance Structures of the six selected centres
- D3.1: Planning of governance, financial and sustainability assessment
- D3.2: Report on plans for a governance structure of the six BBECs
- D3.3: Report on detailed budget for running and maintaining the six BBEC and financial plan for their funding in the short and long term
- D3.4: Plans for vocational, academic and life-long-learning programmes for the existing workforce by the six BBEC
- D4.2 Roadmap Report for BBECs Replication (draft version)
- Osterwalder A., and Pigneur Y. 2010. Business Model Generation A Handbook for Visionaries, Game Changers, and Challengers.
- Papadopoulou, C.-I., Loizou, E. and F. Chatzitheodoridis (2022). "Priorities in Bioeconomy Strategies: A Systematic literature Review". *Energies*, 15: 7258. <https://doi.org/10.3390/en15197258>
- Patermann, C. and A. Aguilar (2018) "The origins of the bioeconomy in the European Union". *New Biotechnology*, 40: 20-24. <http://dx.doi.org/10.1016/j.nbt.2017.04.002>
- Paris, B., Michas, D., Balafoutis, A.T., Nibbi, L., Skvaril, J., Li, H., Pimentel, D., da Silva, C., Athanasopoulou, E., Petropoulos, D., and N. Apostolopoulos (2023). "A Review of the Current Practices of Bioeconomy Education and training in the EU". *Sustainability*, 15(2), 954. <https://doi.org/10.3390/su15020954>

Annex 1. The six BBECs in short

This annex consists of the delivered Business plans in words to be presented for the Advisory board meeting in Ireland, June 27th, 2023.

The Mediterranean BBEC

Executive Summary

The Med-BBEC aims to match the demand and the offer of education and training in the Mediterranean basin, with a specific interest in the characteristic Mediterranean value chains, i.e. food, food waste, fishery and aquaculture.

The Centre, that will be totally virtual, is intended to promote a concept of T-shaped education where sector skills developed in “standard” curricula are complemented with a vision of the bioeconomy, knowledge of different bioeconomy sub-sectors and transversal skills like system-thinking, innovation management and (self-) entrepreneurship. Hence, the target customers are both firms (industry, agencies, public entities), and individuals (workers, unemployed). However, the Centre, at least in the first stages, will not provide direct courses but it will only act as a broker between trainers and trainees.

Nevertheless, the Med-BBEC, through some collateral activities such as communication, dissemination, and continuous identification of job profiles in the bioeconomy, has the ambitious goal of contributing not only at the development of education and training but at the overall growth of the bioeconomy in the Mediterranean.

Market Analysis

The target market is represented by the education and training sector, specifically for the bioeconomy. In this sense, it is not easy to estimate the size of the market. Indeed, if we look at the bioeconomy as a holistic system that includes many different sectors, it is possible to say that the education and training offer in the Mediterranean area is quite limited.

In particular, the main opportunities are in Academia, while in the other educational levels, i.e., Schools, Vocational Education and Training (VET) and Lifelong Learning, the specific courses are rare. Instead, the situation changes if we see the sectors that compose the bioeconomy. Keeping out the specific education and training of these sectors – that also provide skills and competencies important for the bioeconomy –, there is a wide range of courses (more or less structured) that aim to reconnect the sector (e.g., fishery) with the bioeconomy. Nevertheless, for the Mediterranean basin is not possible to evaluate the size of this educational offer, but, also thanks to the BBEC activities, it was possible to understand the present and future needs of the target market:

- Not clear identification of the actors involved in bioeconomy.
- Missing structured educational framework for bioeconomy in the Mediterranean area.
- Demand and offer of education and training misaligned.

- Need to focus on specificities of Mediterranean areas, such as water scarcity, marginal areas and the importance of high-quality food value chains.
- Following the improvement of the bioeconomy there will be the need for educated, skilled, and trained human resources able to work with innovation.
- The ecological transition and the digital transition will increasingly impose the need for many workers to reallocate themselves to the labour market.

Value Proposition

Mediterranean areas have the potential to benefit a lot from the development of a vital and specific bioeconomy sector. The Centre aims to become the reference point for bioeconomy education and training in the Mediterranean area, for both EU and Extra-EU countries. While primarily aiming at contributing to the industry, it exploits synergies between education, innovation processes, communication, and awareness raising through a wide collaboration with all the relevant stakeholders involved in the bioeconomy.

Marketing Strategy

The communication and marketing strategy will not be a sub-branch of the Centre, but it will represent one of the core activities. This choice was made because, currently, the Countries of the Mediterranean basin have no common vocabulary and shared vision about the bioeconomy in the area. Furthermore, communication and dissemination represent the main expertise of some Med-BBEC partners. Hence, the aim is to highlight this strength with several activities. In particular, the strategy foresees:

- Website launch: one of the peculiarities of the Centre is to be totally virtual on an online platform that will be designed as a starting activity, even before the official launch of the Centre. Hence, the launch of the website will be one of the first activities to be communicated. It will be shared on various social media platforms and within the highest number of newsletters edited by national and international actors (e.g. newsletter of BBEC project, CBE-JU, Regions, etc.) as possible.
- Centre launch: the Med-BBEC will be launched with a specific public event. It will gather all the stakeholders involved or interested in the Centre. For this reason, a communication campaign must be prepared for social media channels and media channels. Furthermore, all the communication materials (e.g. flyers, gadgets, etc.) must be designed and ready for the event.
- News & Events: once the website will be established and the Centre will run its activities, the communication experts will continuously update the "News & Events" section. Furthermore, together with the opportunities, this section will be the core of the Med-BBEC newsletter. This newsletter, coherently with the vision of the Centre, will target both the demand and offer of education and training in the Mediterranean bioeconomy.
- Info-day & job-day: although the Centre will be virtual, some on-person events will be held. Indeed, it is planned to organize two different events once a year for each: info-day and job-day. The former is thought to provide all the information about the Centre, the educational and training opportunities and general information about bioeconomy. Instead, the latter will be an opportunity for all the professionals or interested people to meet companies and other actors that support the Centre. The job day is expected to provide

bilateral meetings but also panels with discussions on trends, opportunities and threats within the Mediterranean bioeconomy.

One of the key elements of the marketing and communication strategy will be the network of stakeholders engaged during the BBEC project. Thanks to the so-called “snowball effect”, it is expected that every Centre's partner will share the information about the Med-BBEC with their contacts, asking to share in turn. That is particularly relevant because several of the stakeholders involved are not single firms, but they represent many firms, such as the clusters. However, the communication strategy will be adapted to target all the customer segments (i.e. industry, public administration, public and private education and training entities, NGOs, and private citizens).

Revenue Streams

The revenue streams can be divided into four main categories: public funds; members fees; participants fees; in-kind contributions.

Regarding public funds, it was considered that at least 40% of the revenues are from such kinds of contributions. Because of the interregional dimension of the Centre, it is expected that public funds can derive from international, EU, national and regional frameworks.

Nevertheless, the basis for the working of the Centre will be an annual fee to be paid by members. This will cover the basic staff costs and general costs of running the Centre. A group of 15 members was considered, considering an annual fee per member of 2k € (less than 170 €/month). This fee was discussed with the IRWG. The general opinion is that this fee is not too high for companies and other entities, but it is important to justify this expense with an image or economic return. This will be necessary, especially after the start-up phase.

Also, participants' fees will be important. An internal discussion is still ongoing about the ratio “number of annual participants/ amounts of the fee.” Indeed, it is perceived as more reasonable to have a high number of participants with a low fee. Anyhow, a lower number of participants with higher fees is still on the table because this scenario challenges the Med-BBEC to find certifications or professional qualifications that justify the high fee. In this sense, it is not only a matter of what the Centre offers to the customers, but it might represent what the Centre can offer to the overall bioeconomy. In fact, to date, the specific certifications or professional qualifications for the bioeconomy are still scarce and perceived as scarcely spendable on the market.

Finally, the in-kind contribution is also expected by members, covering many goods and services (e.g., software, hardware, IT licenses, phone and internet connections, etc.) as well as personnel for running the Centre's activities (e.g., industries participation in coaching and mentoring or partners participation in communication and dissemination).

Cost Structure

The Centre does not start from the development of an existing entity/institution, so it needs to be funded as a new legal entity. This involves starting time and costs, including legal costs for the establishment of the Centre. It is expected that the Centre

will not have a physical location but will be hosted at the premises of one of the partner institutions. The activities will be largely held online, through web facilities.

Hence, the necessary investments will include two main streams:

- Investment for Consortium establishment.
- Investment for Centre establishment.

The capital expenditures needed for starting are estimated at around 90k euro, which may be in the range of 110k. This amount may have some flexibility due to lack of use of buildings etc. but will need a high-quality web facility to make sure the Centre is effective and has a good starting. However, the investments for Consortium establishment include:

- Legal and administrative costs for establishing the Consortium.
- Other expenses.

Instead, to set up the Centre, the following items have been considered:

- Personnel for starting activities.
- Website/online platform.
- IT hardware & software.
- Legal consultancy and accountancy.
- Other expenses.

After that, considering the Centre is fully active, the operational expenses (OPEX) have been considered year by year. Taking in mind both the activities and other cost items such as the management and administration costs, the following list was made:

- Management, administration, and general costs.
- "Training the trainers" activity";
- Online services.
- Dissemination & communication.
- "Internships enabler" activity.
- "Mentoring by industry" activity.
- Identification of priorities, skill profiles, education, and training needs.
- Web facility.

Financial Projections

In this section, four tables synthesize what was said in the previous sections about the revenue and expense forecasts. The first table points out the CAPEX, namely the capital expenditures needed for starting both Consortium and Centre. Tables 2 and 3 report, respectively, the foreseen annual revenues and the operational expenditures (OPEX) from year 1 to year 5. Finally, the cash flow for the same period is reported in Table 4.

Table 1. CAPEX in year 1.

CAPEX	
Investments for Consortium establishment	
Legal and administrative costs for establishing the Consortium	8,000 €
Other expenses	10,000 €
Investments for Centre establishment	
Personnel for starting activities	13,500 €
IT hardware & software	13,500 €
Website/Online platform	30,000 €
Legal consultancy and Accountancy	4,300 €
Other expenses	10,000 €
TOTAL CAPEX	89,000 €

Table 2. Annual Revenues years 1 to 5.

REVENUES	YEAR 1	YEAR 2	YEAR 3-5
Fees from members (15)	30,000 €	30,000 €	30,000 €
Fees from participants	10,000 €	15,000 €	25,000 €
In-kind contribution	75,000 €	75,000 €	75,000 €
Public funds	65,000 €	65,000 €	65,000 €
TOTAL REVENUE	180,000 €	185,000 €	195,000 €

Table 3. Annual OPEX years 1 to 5.

OPEX COSTS	YEAR 1	YEAR 2	YEAR 3-5
Management, administration and general costs	119,000 €	119,000 €	119,000 €
Director	72,000 €	72,000 €	72,000 €
Secretary	36,000 €	36,000 €	36,000 €
Accountancy	6,000 €	6,000 €	6,000 €
Translation consultancy	5,000 €	5,000 €	5,000 €
Online services	21,000 €	21,000 €	21,000 €
Web facility		2,000 €	2,000 €
Dissemination & communication	20,500 €	20,500 €	20,500 €
Internships enabler		6,900 €	6,900 €
Mentoring by industry		10,900 €	10,900 €
Training the trainers – at different educational levels			14,500 €
Identification of priorities, skill profiles, education and training needs	6,300 €	6,300 €	6,300 €
TOTAL COSTS	163,800 €	186,600 €	201,100 €

Table 4. Cash flow from year 1 to year 5.

CASH FLOW			
Year	Costs	Revenue	Revenues - Costs
1	239,600 €	180,000 €	- 59,600 €
2	186,600 €	185,000 €	- 1,600 €
3	201,100 €	195,000 €	- 6,100 €
4	201,100 €	195,000 €	- 6,100 €
5	201,100 €	195,000 €	- 6,100 €

Due to the high difference between costs and revenues in the first year, it is possible to imagine two main solutions to break-even:

- Asking for an initial membership fee higher than the annual membership fee;
- Finding a specific fund (e.g., Horizon Europe call) for implementing the Centre.

Although the topic was not discussed properly, it is more realistic to think that the second option would fit better. However, an internal discussion will face this issue.

Key Activities

The Centre will relate to all the education entities at any educational level (academic, VET, lifelong learning) and at any geographical level (local/regional, national, European, international) providing a wide web of opportunities to its customers. It aims

to understand the need and the possibilities for a “training the trainers” course. In this case, the objective is twofold: increasing knowledge, competencies, and skills in teaching bioeconomy; and raising awareness of existing methodologies, approaches, and tools in teaching to different levels of education.

Moreover, the Med-BBEC will provide a series of *experiential and workplace learning activities*, such as online teaching material and internships/mentoring. The former will consist of a valorisation of existing teaching material with the possibility of creating new materials in the future. The latter will be one of the core activities of the Centre and will try to match human resources and industries enabling internships and mentoring.

Finally, also some non-learning activities will be conducted by the Centre, such as dissemination and communication, perceived as fundamental to increase public awareness about bioeconomy and bioeconomy education and training. Moreover, continuous collaboration with industry and the overall bioeconomy ecosystem to identify priorities, skill profiles, education and training needs will be conducted to maintain up-to-date knowledge, job trends, industrial and private sector needs, possibilities for education and training for public administration, possibilities for marginalized people (e.g., NEETs), etc. This activity is perceived by IRWG as a characteristic activity of the Centre, especially for the impact that it could have on bioeconomy growth.

Key Resource

One of the peculiarities of the Centre is to be totally virtual. This aspect is fundamental for the resources needed. Indeed, for the establishment and the first years of activity, the Centre will not require buildings or laboratories. The main resources will be IT (e.g., licenses, software for courses, etc.). The personnel is widely described in the following section “Governance”, however, only two persons are expected to be hired by the Centre, the director and the secretary. To run the Centre, no other facilities are perceived as necessary. However, it is important to underline that many of these resources are expected to be in-kind provided by the Med-BBEC partners. This aspect represents a focal point for the Centre and for its survival.

Partnerships and Alliances

The Association was thought to involve 10 to 25 partners; in principle, economies of scale can justify larger groups, but ensuring a manageable size should be preferable to an association too large, at least at the beginning. Anyhow, all the Mediterranean partners involved in the Med-BBEC (i.e., UNIBO, CTA, FVA, CNR, UAB, SIE) confirmed their interest in the Centre. Moreover, both at the national and international level, a series of actors involved in the bioeconomy has been involved within the IRWG. To date, the actors involved represent universities, local authorities, technology transfer institutes, training centres and digital innovation hubs and communication and dissemination experts. Moreover, the main contact with the industry is represented by clusters rather than direct contact with single companies. For example, in Italy, the agri-food industry cluster and the bio-based chemical industry cluster have been involved. Besides, also some actors from Portugal and Greece expressed their interest in the project. However, also North African countries could represent key alliances for the improvement of the Centre, although, no direct contact has been established yet.

Legal and Regulatory Environment

The institute will be a not-for-profit entity such as an Association. This entity will be most likely legally based in Italy, but conceptually it will be an Italian-Spanish Association. Other Mediterranean countries could join the Association with the idea of integrating both EU and Extra-EU countries of the basin. The Association will be an independent legal entity, avoiding dependence on a single/prevaling partner. Moreover, it will not be devoted to making profits, following an approach compatible with the mission of public partners (e.g., university) and use of public funding. The commitment of industry is sought in particular through intermediary organizations (e.g., clusters) rather than individual companies. Legal requirements and constraints linked to opportunities for funding will be considered at a later stage depending on what is available at the time of implementation (e.g., Next generation EU). Moreover, the legal form and contractual conditions will be set in a way that members could join or leave as flexibly as possible.

Concerning the licenses and permits, the topic was not discussed in detail and further considerations and analysis must be done in the next steps. Nevertheless, during meetings with partners and IRWG, especially the issue of copyright and potential issues on the use and modification of training material turned out more than once. Hence, the issue is clear in mind and represents one of the main points of discussion in the next steps.

Governance

The governance will be defined at a later stage, but the simplest structure is expected with:

- A general assembly
- A president
- A management board
- A scientific council
- A managing director

However, the structured staff is expected to be very thin (2 persons) and will be complemented by in-kind staff contribution by member institutions (e.g., from universities and clusters); this will require a specification of tasks, roles and duties. The 2 identified persons, to date, are a director and a secretary. These two figures will ensure the establishment of the Centre during the start-up phase.

In particular, the director is expected to be, at least in the first years, a person involved in education with competencies in management. Indeed, as discussed with IRWG, the first stages of the Centre will be fundamental to guarantee the consistency of the educational and training offer, rather than the corporate management. Moreover, this person will take care of the relationships between partners within the Centre and with external stakeholders. It is reasonable to think that, after some years, the figure of the director can be split in two: a General Manager – more focused on strategies, business plans, relationships, and corporate image – and an Education Manager – more focused on the educational part, coordinating trainers, materials, and tools.

Instead, the secretary is expected to take care of all the bureaucratic and administrative parts. More in detail, this person will be an expert in European and national funds and will coordinate the applications for them. Other tasks could be the financial management of specific projects or the purchase of goods and services (e.g., Educational software for Distance Learning).

Risk Assessment

One of the most important challenges the Centre will face concerns the initial financial commitment of partners. Indeed, the current configuration of the Med-BBEC implies partners something highly challenging both operationally (in-kind contribution) and financially. It is reasonable to think that some partners may decide to withdraw. In this case, it will be important to plan a financial strategy that ensures a share of guaranteed capital, covering the highest percentage of expenses.

However, nowadays, one of the main ways to access capital is participation in projects such as Horizon Europe or CBE-JU. In some cases, that represents a strategic asset for companies. Nevertheless, it would be preferable to avoid this approach. Indeed, the long-term vision of the Centre does not fit well with this approach, which has high uncertainty and a short-term horizon. Instead, the scope of the Centre is to be independent and able to survive thanks to its resources.

In general, the competition is not seen as a challenge for the Centre as long as will be able to fill the gap in the bioeconomy education and training market. Of course, it will be important to think about forms of interaction with partners to guarantee the coherence of the Centre with its vision and mission.

Finally, another issue can be the relationship with the other European BBECs. Indeed, the stream of material and opportunities may require too many resources – especially work units – that might not be covered by the Med-BBEC. Because this can happen also for the other BBECs, one solution could be the establishment of an EU-BBEC that has the role of coordinating and sharing the current six BBECs. This aspect may be discussed further with all the BBEC Consortium

The Finnish BBEC

Executive Summary

The Finnish BBEC functions as an online collaboration and innovation platform within the forest-based bioeconomy. It involves eight key actors from research, educational and business-related organisations in the North Karelia region in Finland.

The mission of the Finnish BBEC is to combat global challenges through the collaboration between education, research, and industry. Hence, the target audience for the platform are students, researchers and research groups and companies within forest-based bioeconomy.

The platform combines services from all these actors so that they can collaborate more effectively. The goal of the BBEC is to make the actors collaborate through education, business or research so that each actor benefits from the collaboration and at the same time global challenges are solved.

Market Analysis

Currently, there is an increasing debate regarding the use of forests in Finland. A lot is expected from the national forests – they are expected to support the Finnish economy through forest-based bioeconomy and related products and services, mitigate climate change through carbon fixation, maintain biodiversity and provide wellbeing for the society. European Union's strategies and directives have a strong effect on the Finnish forest use and forest-based bioeconomy. Especially the bioeconomy strategy, forest strategy, biodiversity and restoration directives are in a central position.

Finland has also its own bioeconomy strategy, updated in 2022, which directs the use of forests to increase the value added of products and development of education and research. There is a high demand for bio-based products to replace fossil-based products. Furthermore, digitalization and automatization as well as material and energy efficiency will affect the operating environment of the forest-based bioeconomy. Hence there is an urgent need to develop sustainable forest-based bioeconomy. The North Karelia region offers great potential for the development of a forest-based bioeconomy since there are several educational and research organisations as well as different sized companies in the area. The turnover of the sector is estimated at 1.4 billion €.

There are over 2000 forest-based bioeconomy experts in the region as well as hundreds of both Finnish and international students in the three educational organisations. So far, these organisations have collaborated case by case, and hence no strategic, long-term collaboration has been developed. Especially, the local companies seem to remain somewhat unattached from the research and education communities and similarly the research and education organizations could benefit from collaborating with the companies.

Value Proposition

The general value proposition for the Finnish BBEC is to increase collaboration between education, research, and industry within the forest-based bioeconomy. In practice this

is executed in the platform in the form of service offerings that anyone creates. Through the offerings any actor, be it a student, researcher, or a company, can pitch their service to the network. Hence, students, researchers and companies benefit from collaboration differently.

Through the BBEC students gain relevant thesis topics and gain employment and trainee opportunities from the companies. Especially international students become connected with local companies through traineeships. Teachers from different organisations and education levels share knowledge and take part in each other's teaching. Researchers gain new research topics from businesses and simultaneously new business potential and innovation might emerge while leading to new start-ups. Companies can employ new staff from students and researchers and connect with international networks through the BBEC. Through collaboration, new projects can emerge where various organisations and people collide. Finally, sustainability challenges are solved together with actors from educational organisations, researchers, and businesses.

Marketing Strategy

The online collaboration platform will be the basis for communication within the BBEC. Furthermore, LinkedIn will be used as a communication and marketing channel to share blog posts and communicate with stakeholders. The coordinator of the platform will be responsible for implementing the marketing and communications activities. The platform itself will be promoted through the key actor organizations' own websites and social media platforms. The Finnish BBEC will be present in different regional, national, and international events regarding forest-based bioeconomy. Students will be reached through student networking events and companies through different business networks e.g., chamber of commerce etc.

Revenue Streams

No direct revenues are gained from the BBEC. Instead, when a platform user provides a service to for instance a company, the revenues are directed straight to the user and not to the BBEC. The BBEC only functions as an open collaboration platform presenting different service offerings. For instance, one of the key actors Natural Resources Institute (Luke) offers a service called "Rent a genius" through which researchers are hired to companies to work on a specific issue. The customer company directly pays Luke for this service and the BBEC platform is there just to provide information on the service and connect the involved actors – Luke and the company. With regards to educational services, e.g., the thesis work offered by the BSc and MSc level students, the company involved directly pays the student for the thesis work. Here again, the platform functions as a collaboration platform for the students and companies to get involved. These revenues are estimated to be worth 50 000€/year.

Cost Structure

The main costs relate to setting up the online collaboration platform. This will cost approximately 15 000 € if an outside website developer is used and specific functionalities are obtained as well as website/domain licenses for some years forward. The concept development in the beginning will cost an additional 15 000 € through which social media, communications and marketing practices would be set up and key actor meetings would be organized. Here also 5 000€ would be dedicated

to administrative costs including organization and planning of the first-year activities. All the appliances needed, e.g., laptop and mobile phone, would be provided by the platform coordinator organization and hence they are not included in the BBEC's costs.

BBEC activities, including e.g., joint lectures or courses will be financed by the key actors themselves and no operational costs are incurred here. No costs are derived from teaching since this is provided through the key actors and some costs could be dedicated directly to the key actor organisations. No physical buildings are needed for the BBEC. The coordinator of the BBEC will work in the premises of Business Joensuu or other coordinator organization (once it has been determined). The rents for spaces in each key actor organization for specific staff working with the BBEC as well as the coordinator will be included in the management and administrative costs. The operational costs for the BBEC include salary for the BBEC platform coordinator. The salary for this senior-level position will range from 5500-6500 €/month (including insurance and other employment costs) depending on the person's previous experience and educational background. Marketing and communication costs including production of videos, pictures, and other social media activity, will cost approximately 6 000 €/year.

In addition, an additional 10 000-15 000€/year/key actor participation fee will be required (in total 80 000-100k€/per year) to secure the stability of the BBEC.

Financial Projections

Revenues gained from services provided through the BBEC are directed at the key actor involved. These revenues are estimated to be worth approximately 50 000€/year. Some revenues are expected to derive from the key actors' participation in the BBEC. This would be approximately 10-15 000€/year/key actor, altogether 80-100k € per year. Within five years' time, the goal is to gain most revenue from the offered services and keep the participation fees low. In practice this would mean that the participation fees would be approximately 50k € and income gained from services would be 100k €. Furthermore, in the future more participant payments could be derived from local companies.

Furthermore, some public funding, e.g., from regional innovation/development fund, could be applied for developing the platform. The applied sum would be approx. 150-300 000 €. Several key actors could be part of applying for the fund while the majority would be directed to the coordination and development of the BBEC.

The main difference in the cash flows between the first and years proceeding is that there is the main investment for the online platform during the first year as well as some administrative and concept development costs. After the first year of operating, the costs relate to operational expenses such as salaries, marketing and communications costs and revenues derive from key actor participation fees and services provided.

Key Activities

The key educational activities of the Finnish BBEC include learning activities and experiential and workplace learning activities. The main learning activities of the BBEC include organizing two courses: 'Forest-based bioeconomy course for students in

bachelor level in the Karelia University of Applied Sciences and University of Eastern Finland', and 'Sustainable forest-based bioeconomy for teachers'.

The aim of the first course is to create a profound understanding of forest-based bioeconomy for bachelor-level students. This activity is coordinated by the UEF and Karelia together. The course will be organized in the autumn period. The aim of the second course is to create a profound and common understanding of the sustainability transition affecting the forest-based bioeconomy among teachers at Karelia University of Applied Science, University of Eastern Finland and Riveria Vocational School and to share ideas, methods and knowledge between the three organisations. Experiential and workplace learning activities include integrating international students into the region through internships.

The aim of this activity is to integrate international students to the North Karelia region through internships in local companies and simultaneously provide international networking possibilities for local companies. In this activity, the international master's level students are introduced to local companies and if the right match is found, a student can complete his/her internship in the company. A UEF representative will coordinate this activity. BBEC platform is used to promote all these activities and also used as a marketing brand.

Non-educational key activities include coordinating the open collaboration platform. On the platform, different actors' knowledge and know-how and contact information are presented and this way actors can connect to each other depending on needed services or knowledge. Hence, all activities of the BBEC occur in practice through the platform. Finally, the BBEC organises events and creates the conversation through blogposts on topical issues in forest-based bioeconomy.

Key Resources

The key resources for the Finnish BBEC are diverse knowledge in bioeconomy, international and national students, researchers and research infrastructure, know-how in funding and project management. The key actors involved in the BBEC provide wide expertise in bioeconomy that can be utilized in collaborating, for example with companies. Furthermore, they have expertise in gaining funding and managing different sized projects. In the three involved educational organizations, there are students studying forest-based bioeconomy-related topics at three educational levels. The students are a crucial part of the collaboration.

Furthermore, the BBEC platform coordinator and one representative from each key actor organization are required. The platform coordinator will work in the premises of the organization (Business Joensuu or University of Eastern Finland) and will be equipped with appropriate appliances. All other equipment and technology will be used from the key actor organisations directly.

Partnerships and Alliances

There will be a partnership between the key actor organisations involved in the BBEC (eight organisations). Furthermore, the Finnish BBEC is connected to several national and international networks such as the European Bioeconomy University network, Bioregions Facility, NOVA university network, FOBI (Forests and Bioeconomy) research



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.

community and UNITE Flagship. In addition, the BBEC is connected to a regional development initiative InnoCity and University of Eastern Finland's ecosystem network.

Legal and Regulatory Environment

Each key actor organization has its own legal and regulatory context to which to apply. For instance, for UEF there are specific rules for IPR protocol which are always followed in research-to-business cases. GDPR guidelines are followed by each key actor organization and entailed in the collaboration platform. Furthermore, there are specified rules for participating in the online platform.

Governance

The Finnish BBEC operates as an open collaboration platform. The coordinator of the platform will work under one of the key actor organisations (Business Joensuu or UEF). Eight key actors are part of the BBEC: UEF, Karelia, Riveria, Business Joensuu, Luke, Syke, Metsäkeskus and EFI. The key actors will function as the main management and governance body of the BBEC. Furthermore, the platform coordinator directs the BBEC's daily activities. Key actor organisations will manage their own personnel's training and selection as well as working conditions related to the BBEC.

Strategic decisions will be made in the steering group meetings. The steering group will meet approximately four times a year. At least one person from each key actor organization and some company representatives will be part of the BBEC steering group meetings. The steering group will discuss relevant issues and plan future activities for the BBEC. The coordinator of the platform will be part of the steering group as well and plan his/her activities according to the steering group's decisions and directions. Each key actor organization will dedicate tasks related to BBEC platform and services to specific experts in their own organizations. Occasionally they can participate in the steering group meetings representing results of their work related to the BBEC. Other important issues can be discussed in smaller key actor meetings.

At the operational level, the coordinator will make decisions regarding the platform's daily issues while following the plans and strategies of the steering group. The coordinator of the platform plans the annual cycle and activities with the guidelines of the steering group. The steering group will evaluate an annual plan before it is established as well as at the end of the operating year to evaluate its execution. Furthermore, the coordinator will self-evaluate each operating year's activities based on the plan and present improvement ideas and comments to the steering group. Each key actor organization's contact person will discuss relevant issues with the experts in their own organization and make decisions regarding their own services and activities.

Risk Assessment

There are some risks and challenges related to the Finnish BBEC development. Firstly, several industry-research-education ecosystems have already been developed in different Finnish regions. However, these are based on other aspects than forest-based bioeconomy, e.g., circularity or water. There is potential in collaborating with other ecosystems instead of competing with them. The Finnish BBEC also differs from other ecosystems since it is an online platform based.

Another risk relates to the management of the BBEC. There is a small risk that a suitable coordinator organization for the BBEC will not be found. However, this risk is considered rather small since the University of Eastern Finland and Business Joensuu already have appointed great interest in coordinating the platform. Furthermore, if no eligible coordinator is found, the BBEC can be developed as a project in the future. There is a potential lack of commitment from the key actors involved in the BBEC. Each involved key actor must be motivated and dedicated to the BBEC and see the potential of being involved in it. Hence, the management body of the BBEC could be tightened to three key actors instead of eight in the future. Another challenge would be the local companies' unwillingness to engage with the BBEC activities. To overcome this challenge, the BBEC will collaborate actively with the companies through different networks and channels and some companies will be involved in the steering group. Furthermore, it must be validated that companies benefit from the collaboration with e.g., research or educational institutions.

The Central European BBEC

Executive Summary

The BBEC CE will act as a knowledge hub to educate and to raise awareness about bioeconomy in the region, develop education offer, enhance, and facilitate the cooperation between various regional actors, particularly between industry and science. The mission will be to enhance the development of the bioeconomy potential in the region considering the regional diversity. It will also support and participate in the development of bioeconomy strategies and roadmaps in the region. The target groups will cover the entire value chain of the bioeconomy: industry, research institutes, academia, public administration, clusters, networks, NGO's, consulting, media. The BBEC CE activities will support the exchange of knowledge between the stakeholders, sharing information about valuable education and training opportunities, providing educational materials and expertise to raise awareness, cooperation between science and industry, other networks and initiatives. They can also be the basic elements for the establishment of a business-oriented platform, implementing the available know-how in a sustainable bio-based perspective.

Market Analysis

Central Eastern Europe will be the **target market**. The BBEC CE will be piloted by Poland with cooperation with the Czech Republic and Bulgaria to cover the whole BIOEAST countries. As of December 2022, in the microregion, only Latvia from BBEC CE countries had a national bioeconomy strategy. Other countries have such strategies under development (Czechia, Croatia, Hungary, Lithuania, Poland, and Slovakia). Estonia has other policy initiatives dedicated to the bioeconomy. Bulgaria is one of the countries in the European Union that has not yet adopted the National Bioeconomy Strategy and Action Plan. However specific frameworks and strategic documents have been adopted and are in force to mark the development of the bioeconomy sectors.¹

The research among the stakeholders carried out during the project showed that there are several **needs that have to be addressed**. One of the most important points is raising awareness and basic knowledge on bioeconomy in the region. Then supporting and enhancing the cooperation between stakeholders, especially between academia and industry. It is crucial to take advantage of already existing solutions, initiatives, resources, and practices of the bioeconomy without creating a new institution. The highlighted point was to promote international cooperation and mobility with countries where bioeconomy awareness is higher. There is also a need for educational tools, didactical resources, content, and expertise to educational institutions. Due to constant change and technological development, the crucial matter is to anticipate the trends within the industry to create flexible education offers that improve the current curricula. The whole scope should be supported by consulting services especially to the public sector to serve as a connector with other stakeholders. There are also a number of **trends** that the BBEC CE must follow. We can mention the necessity of implementation of EU Bioeconomy Strategy on national level, growing demand for skilled workforce in Bioeconomy, growing demand for flexible

¹ National Development Programme BULGARIA 2030, National Strategy for Small and Medium-Sized Enterprises for 2021-2027, National Climate Change Adaptation Strategy and Plan for action

education. A thematic study on Education Practices and Needs in the BioEast region was conducted in March 2022 under the supervision of the “BioEast Thematic working group (TWG) on Education. This study reflects the current situation in the region and highlights key activities and priorities to be considered. The bioeconomy should go in line with developing a circular economy, protecting the environment and natural resources.

Value Proposition:

The BBEC CE will create a unique value proposition on the regional market by providing access to the network of the bioeconomy stakeholders operating in Central Eastern Europe. It will also provide opportunities to cooperate and create partnerships aimed at creating joint national and international projects. The BBEC CE will answer the urgent need to connect industry actors with academia and science and to facilitate various types of cooperation in the field of flexible education for employees, tailored curricula, knowledge and technology transfer, and staff exchange. The BBEC CE will facilitate a platform for meetings and events to promote the development of bioeconomy education, educational and scientific offers and scientific achievements and support the development of bioeconomy regional strategies. The BBEC CE will also cooperate with other BBEC's and ongoing initiatives to boost the cooperation between CE actors and countries from Western Europe in which the bioeconomy policies are more mature and well established.

It has to be highlighted that the BBEC CE will follow and support the regional development of the national bioeconomy strategies and policies. The BBEC CE has an ambition to participate in that process and due to this provide as many advantages to the regional actors and market as possible.

Marketing Strategy:

The BBEC CE will have its own corporate identity, especially a separate website, visualizations, logo, and social media channels. The key task of marketing activities will be to spread information about the existence of BBEC CE, its goals, mission, and activities. Traditional communication tools like leaflets, brochures, folders, and roll-ups will also be developed. It is planned to take active participation in events related to innovative education methods, conferences related to bioeconomy and other EU initiatives. In addition, contacts will be established with employers' organisations, NGOs, and national bioeconomy clusters. The BBEC CE will also organize its own networking event for current and future members.

Revenue Streams:

When describing revenue streams of the BBEC CE it must be highlighted that the organization will intend to fit the current possibilities of external funding in the region. In the first years of operation, public funding will be the main revenue stream. It is necessary to fully develop a value proposition for stakeholders in the region and to follow the emerging trends of bioeconomy in the region. After the capacity-building stage, it is planned to introduce fees for BBEC CE affiliated members. Another revenue stream will relate to developing tailored curricula for the industry. During the capacity building stage, it is planned to develop an online platform for knowledge exchange. The access to the online platform will also be a revenue stream for the BBEC CE. Having in mind the emerging bioeconomy market and related to its policy in the region it is

also planned to introduce other services by BBEC CE. It will be a part of the capacity-building stage where there will be a detailed analysis of the stakeholders needs and appearing opportunities which will result in new revenue streams.

Cost Structure:

The planned **investment costs** reflect the challenges faced by the BBEC CE. Activities to raise awareness and support contacts between science and industry require professional equipment tools to facilitate contacts between key stakeholders. Due to this fact, it will be necessary to develop a dedicated online platform for the exchange of knowledge between stakeholders included in the BBEC CE network. Members will gain access to a space to support contacts with other entities, obtain information about cooperation opportunities, and organization of internships, and offer courses in the field of bioeconomy. It will also be a place where calls for external funding and offers to join consortia will be published.

A dedicated website will also be developed. It will be a communication channel for the environment and for bioeconomy actors from the region. It will contain i.e., news from the activities of BBEC CE, publications of partners and members aimed at disseminating knowledge about bioeconomy, and articles. It will also provide access to databases developed by BBEC CE (education and training providers in bioeconomy, exchange programs, international mobility, internships and practices for students and science staff). The other necessary investments are communication materials (leaflets, brochures, folders, roll-ups, and posters). It is planned to modernize the office space and purchase hardware, and IT software for hybrid events and conference materials. The purpose of the investments will lead to expanding the network of contacts and members of BBEC CE, and create conditions for the exchange of knowledge, and experience, to undertake educational initiatives.

The operational expenses will cover external experts to develop tailored educational training curricula, mapping of industry needs in terms of dedicated training, developing tools and materials to raise awareness and basic and advanced knowledge about the bioeconomy, creating databases of education and training providers in bioeconomy and exchange programs, international mobility, internships and practices for students and science staff. The databases will be continuously updated every 2 months. The costs of renting training and conference rooms for the organization of workshops and conferences are included. Other costs are related to the salaries of the coordination team, travel costs, IT maintenance and other administrative costs (indirect).

Financial Projections:

It is planned that for the purpose of capacity building the BBEC CE for the first 4 years will be in the development and piloting period. It will be funded by external funding (European, National, Regional). In the fifth year of operation, it is planned to introduce the implementation of part of the activity on a commercial basis. Revenues will be generated that will ensure financial liquidity.

Key Activities:

Key activities are set in an action plan that is projected for a five-year period. Activities are divided in five main tasks followed by subtask to reach the main goals:

1. Supporting the exchange of knowledge between the stakeholders, will be completed by the development of an on-line platform for stakeholders that supports the exchange of knowledge, development of a network of stakeholders (IRWG members, other stakeholders), facilitation of contacts within the network, promotion of interactions, knowledge sharing and mutual learning within the network (regular meetings and workshops, joint events), providing information about upcoming calls (EU and national funds), supporting and facilitating the process of development of project application.

2. Sharing information about valuable education and training opportunities, will be completed by creating a database of education and training providers in bioeconomy, continuously updating the database of education and training providers in bioeconomy, creating an assessment methodology of the education and training offers and providers, conducting the benchmark activities as for the offers of other European and international bioeconomy educational centres, promoting the valuable education offers in the form of training, webinars, lecture, coaching activities (especially for BBEC members).

3. Providing educational materials and expertise to raise awareness, will be completed by developing tools and materials to raise awareness and basic and also advanced knowledge about the bioeconomy, lectures and presentations to support the EU, national and regional bioeconomy strategies, a conference promoting bioeconomy in the region, participation in events and workshops related to bioeconomy on regional, national and European level, organization of events and workshops to promote bioeconomy in the region.

4 Supporting cooperation between science and industry, will be completed by mapping the regional needs to provide tailored educational and training curricula (also non-bio workers: lawyers, IT, engineers etc.), creating a database about exchange programs, international mobility, internships and practices for students and science staff, continuous updating the database of exchange programs, international mobility, internships and practices for students and science staff, promoting exchange programs, international mobility, internships and practices for students and science staff, involving private sector (Industry) into cooperation with students (job offers, internships, opportunities to write diploma thesis, involvement in projects).

5 Management and cooperation between the BBEC's and other initiatives

Key Resources:

One of the most important key resources available is personnel dedicated to the management of BBEC CE. They have advanced knowledge of bioeconomy, management, finance, external funding expertise and European policies related to this area. Further key resources are partners and stakeholders who have an excellent staff and R&D infrastructure, knowledge, and experience. Crucial for the BBEC CE development is a network of already existing educational institutions, universities, science institutes and EU initiatives. An important issue is to provide direct investment possibilities from institutional and/or private resources. This requires a strategy for attracting these investments and raises the issue of the need to educate the potential investors.

Partnerships and Alliances:

In this regard there are few macroregional initiatives but the most relevant to the BBEC CE and which covers the area is BIOEAST - Central-Eastern European Initiative for Knowledge-based Agriculture, Aquaculture and Forestry in the Bioeconomy which offers a shared strategic research and innovation framework for working towards sustainable bioeconomy in the Central and Eastern European (CEE) countries. It promotes bioeconomy development in 11 central and eastern European countries, where bioeconomy deployment is currently less advanced. BIOEAST is supported by the European Union's Horizon 2020 Programme for Research and Innovation. This initiative is essential in the field of future national bioeconomy strategies which will influence the actions of BBEC CE the most.

Another valuable initiative affiliated with the BBEC CE is CEE2ACT project which is aimed at the development of the National Bioeconomy Hubs in European countries without Bioeconomy Strategies, applying a bottom-up approach and co-creation methods in the creation of targeted national bioeconomy strategies, deepening cooperation for bioeconomy policy development in CEE2ACT countries, supporting the green transition and climate neutrality leading to a more informed decision-making process, increased awareness and skills related to the bioeconomy, the drivers of the green transition and best practices on stakeholder engagement in co-creating bioeconomy roadmaps. On the national level there are many important actors, for example, Centre for Preclinical Research and Technology (CEPT) – the largest biomedical and biotechnological venture in Central and Eastern Europe and at the same time the largest investment in science in Poland.

Legal and Regulatory Environment

The BBEC CE will be a consortium of four independent entities: Zemědělský výzkum, spol. s r. o. (Czech Republic), Trakia University (Bulgaria), The Educational Research Institute (Poland) and Foundation of Education and Social Dialogue "PRO CIVIS" (Poland). No new legal entity based in a specific location will be created. The structure of BBEC CE will be distributed virtually. In this way, flexible actions of coordinators and all members will be possible to achieve the assumed goals and activities.

The cooperation between the entities will be based on the Memorandum of Understanding in which each partner will be able to indicate a willingness to cooperate to fulfil the Action Plan of the BBEC CE for the period of 5 years after the BBEC Project finalization. The document will be voluntary and each of the entities will be able to decide to withdraw from coordination the development of BBEC CE due to various circumstances. BBEC CE will have its own corporate identity conveyed in a separate website, visualizations, logo, and social media channels. Local offices of the BBEC will be established within the premises of the partners' infrastructure.

Governance

The BBEC CE will have a simple structure that will enable participants to integrate in thematic groups that are most important to them. This model assumes active actions in many fields. Therefore, the structure must allow the creation of additional working groups dedicated to specific initiatives. The BBEC CE will also cooperate with other established BBEC's and EU initiatives.



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.

The main governing body of the BBEC CE will be **Steering Group**. The steering group will include representatives of the Partners, the main tasks will be: creation of corporate identity for BBEC CE, creating action plans for each year, initiating activities related to the fulfilment of BBEC CE annual plans, active communication with stakeholder groups within BBEC CE, active communication with the socio-economic environment, coordinating and monitoring BBEC CE activities in the context of achieving the assumed goals, participation in organizing internal and external events related to the activities of BBEC CE, engaging possible new stakeholders, communication activities (other BBEC's, media, target audiences, other valuable initiatives and networks).

The Stakeholder groups will be created by each country of the Steering Group members: Bulgaria, Czech Republic, Poland. The BBEC CE is open to creating other groups in the region. Members of the groups will participate in regular meetings organized by representatives of the Steering Group. The Steering Group will also organize meetings for the stakeholders from the whole BBEC CE region.

The working groups will be established when a decision to implement a joint initiative or undertaking is made, working group dedicated to a given topic will be created. Working groups will be coordinated by a member of the Steering Group or a person from the group of stakeholders who is the initiator of the activity.

The working groups will have a clearly defined goal and work schedule. During the work, at any time, members may decide to dissolve the group if they consider that the conditions for cooperation have changed. It would mean that it is impossible to achieve the goal, the goal has become unrealistic, or the goal has been achieved and there is no justification for the group's further operation.

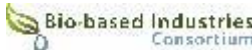
Risk Assessment:

The individual countries in Central-Eastern Europe have their own areas of specialization in bioeconomy regarding types of biomasses, the level of economic development, and socio-cultural conditions. The region is very diverse. Majority of the countries haven't established a national bioeconomy strategy. Due to this fact a significant challenge is the issue of awareness in the region of what bioeconomy is and what is its role in the EU policy and regional development. Many entities, especially from industry, agriculture, and related sectors, do not feel part of the bioeconomy and may not want to cooperate with BBEC CE.

Financing from external sources is not a risk factor. The analysis of available sources at the European, regional, and national levels indicates that the coming years will be very rich in financing the activities and development of BBEC CE. It also indicates that the initiative is in line with general trends and plans of EU institutions.

However, the risk concerns the implementation of commercial services by BBEC CE in the following years of its operation. To minimize the risks active action will be taken to build a cooperation system and to raise awareness among the actors in the region, indicating clear benefits from investing one's own capital in this initiative.

Given the particular context of the macro-region it would be effective the elaboration of an inclusive risk analysis model, including, besides the assessment, key risk-management suggestions and a convincing risk-communication strategy.



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.

The Irish BBEC

Executive Summary:

The strategic vision of the Irish BBEC is excellence in conducting and supporting education, research, assessment, and promotion of the bioeconomy in Ireland to boost the growth of the national bioeconomy. The focus for the Irish BBEC will be agriculture, food and the marine thus reflecting the key sectors in the national bioeconomy. It will operate in several key areas: Co-ordination and development of educational programmes & bioeconomy apprenticeships, schools & community engagement, EU interuniversity programmes, mentoring and advisory role, develop and maintain bioeconomy project library & IP portal, develop and maintain talent, jobs & skills hub.

The Irish BBEC will be coordinated by Munster Technological University (MTU) with the support of the Irish Bioeconomy Foundation (IBF) and will provide the overarching mapping of the Irish bioeconomy, producing an online knowledge database for all bioeconomy stakeholders and specifically geared towards education. The Irish BBEC along with the other regional BBECs aims to progress new ways of learning and accessing education and knowledge access and increasing the flow of expertise from leading universities across Europe.

Market Analysis:

The National Policy Statement on the Bioeconomy in Ireland (2018), sought to develop the bioeconomy in Ireland with a focus on strategic policy objectives such as sustainable development, decarbonisation and environmental, social and economic sustainability. As part of this statement, the government established a high-level cross-government Bioeconomy Implementation Group (BIG) to bring forward recommendations to further develop the bioeconomy and bring policy coherence to all sectors. Through engagement with state agencies, commercial companies, research centres and clusters, BIG has produced several key reports (2019 & 2022). These reports along with other key reports from The Bioeconomy Forum and the "Fast Track to Policy – Circular Bioeconomy Outlook Study 2030-2050", provide recommendations to inform national policy development. These policies then ensure that energy and funding are funnelled into the appropriate sectors.

The reports show that there is still a lack of broad public, community and industry understanding and awareness of the bioeconomy opportunity. As a result, new policy implementation pillars have emerged which include:

- Governance
- Research, Development & Innovation
- Nature, Climate and Circular
- Agriculture, Forestry & the Marine
- Communities
- Industry & Enterprise
- Knowledge & Skills

As part of the Knowledge & Skills pillar, the reports listed above in addition to "skills gap" reports such as "Talent for Ireland's Green Economy 2022" have shown that there

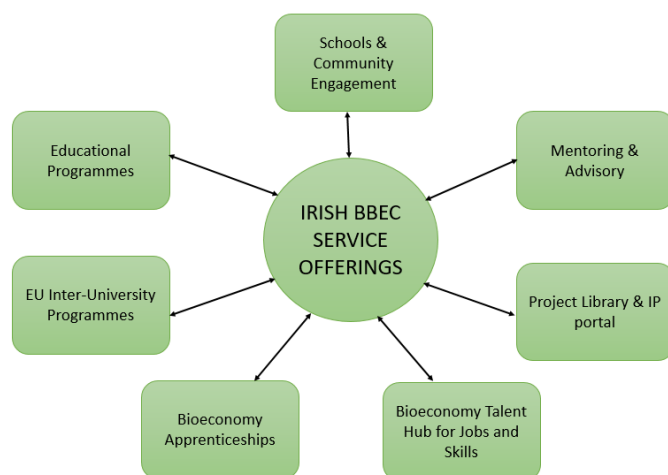
is no overarching mapping of bioeconomy integration into Irish education, training, and skills curricula. There is also a lack of comprehensive information on skills gaps and shortages in the sector. The Irish BBEC therefore has an opportunity to meet these requirements and provide the overarching mapping of the Irish bioeconomy, providing an online knowledge database for all bioeconomy stakeholders and specifically geared towards education.

Value Proposition: Development of skills and talent pipeline for industry.

The Irish BBEC will provide an online knowledge database for all Irish bioeconomy stakeholders to contribute to by identifying their needs, expertise, resources, and areas of study. The Irish BBEC will coordinate and market the educational courses on offer at the various levels, acting as a coordination hub between existing educational institutions and their bioeconomy-related offerings. Key focus areas of the Irish bioeconomy that the Irish BBEC are Agriculture, Food and Marine.

The key service offerings of the Irish BBEC are:

- Co-ordination and development of educational programmes (including short courses both accredited and non-accredited and postgraduate)
- Development of Bioeconomy apprenticeships
- Develop and maintain the Bioeconomy Project library & IP portal.
- Develop and maintain Talent, Jobs & skills hub.
- Schools & community engagement
- Mentoring and advisory – Technical mentoring and access to European experts
- EU-Interuniversity programmes



Marketing Strategy:

The community manager will coordinate the marketing strategy at the Irish BBEC which will use strong brand awareness to develop and monetise the network and develop stakeholder mapping. Marketing will be leveraged through partner networks and cross-promotion through BBEC partners MTU, IBF and by inclusion of new partners. The Irish BBEC website will link to partner websites and along with social media, will collate and promote content from the partners to a wider audience. Additional tools

such as newsletters, blogs, PR articles will be fed onto the website and out to the audience. The Irish Bioeconomy week will play a key part in the marketing strategy.

Revenue Streams:

It is envisioned that the Irish BBEC will require grant funding. The total funding based on a 3-year operation cycle would need to be 485400€ to meet the estimated operational costs as described below.

Additional revenue streams have been assessed and could include:

- Participation in national and EU education and skills-related projects
- Income from finders' fees from students funnelled into courses
- Technical Mentoring
- Bioeconomy Apprenticeships – leverage of MTU and partner organisation staff skillset to create industry coaching days
- Income from one-day training & upskilling events
- Networking and Knowledge Exchange Events

Cost Structure:

The Irish BBEC will be located within the MTU Kerry campus (CIRCBIO office) and will have access to the facilities, technology, and resources of MTU (with support from IBF). The main operating costs will be two staff salaries (programme and community managers) with an annual cost of 128000€ per annum. Other operating costs include travel, event hosting, mentoring sessions, online collaborative tools (such as Canvas, Miro, Zoom), website support and hosting and a careers and skills mining tool. These ancillary operating costs total 28800€ per annum, bringing the total annual cost to 156800€. In year one there will be an additional one-off website development cost of 15000€ bringing the total 3-year cost to 485400€.

Financial Projections: Cost structure vs any potential revenue

It is envisioned that the Irish BBEC will require grant funding. This funding would need to be made available each year in Month 1 to ensure smooth operation of the centre. The funding would amount to the total annual budget as described above, 171800€ in year 1 and 156800€ in each of years 2 and 3.

Additional revenue streams have been assessed, but the income from them is not expected to cover the annual operating costs and would be used to fund events/expert speakers which cannot be met by the core budget.

Service Offerings:

This section describes the processes involved in delivering the service offerings of the Irish BBEC:

Pillar 1: Co-ordination and development of educational programmes in collaboration with MTU (including short courses both accredited and non-accredited and postgraduate)

The Irish BBEC will promote and market the educational courses on offer at the various levels, acting as a coordination hub between existing educational institutions and their bioeconomy-related offerings. There are currently several bioeconomy-based educational programs on offer at various levels in Ireland therefore this coordination is vitally important to attract prospective students, reduce the risk of course duplication

and design course content which is aligned with current and future industry needs. The existing educational institutions will be invited to join the common marketing of their courses to attract new students/customers depending on the nature of the educational activity and type of institution. The Irish BBEC will make use of existing programs and learning materials and will propose new courses as required based on demand and industry engagement studies. The BBEC will support and enable the Universities to gain Industry support for new program development, validation, and funding (for example Springboard funded programmes).

Pillar 2: Development of Bioeconomy apprenticeships

MTU has long-standing institutional experience in the delivery of apprenticeship programs across a wide range of sectors, making them well-placed to develop new, bioeconomy focussed programs. With their new bioprocess pilot plant facility and training infrastructure, IBF will be a key partner in apprenticeship development. The Irish BBEC will liaise with industry partners to develop apprenticeship programs which will develop the required talent for industry thus supporting growth and competitiveness in the bioeconomy.

Pillar 3: Develop and maintain Talent, Jobs & Skills hub.

The Irish BBEC will facilitate networking events focused on jobs and apprenticeships and will act as an intermediary between industry and the education sector to ensure placement of suitably qualified interns. The BBEC will work closely with industry on skills needs assessment and identifying opportunities for knowledge exchange and program development. The Irish BBEC proposes using a data mining tool to feed into a talent hub on the Irish BBEC website which will collate relevant positions across the sector.

Pillar 4: Schools & Community engagement

The Irish BBEC will present innovative solutions so that Ireland's education system can respond to the knowledge, skills and talent needs of society. Flexible and personalised learning systems will involve stackable micro-courses, summer schools, innovation sprints for students along with professional development of students, community stakeholders and those in the workplace. Participation in events such as National Science week will form a key part of this engagement, along with leveraging the skills of experts within partners such as CIRCBIO and IBF to visit schools and community groups for bioeconomy events.

Pillar 5: Technical Mentoring and Advisory

The Irish BBEC will provide technical expertise from industry stakeholders working in the bioeconomy sector and from partner R&D centres and will provide access to EU experts through their relationship with EU partner organisations.

Pillar 6: EU Interuniversity programs

Through its links with BBEC EU partners and MTU partner universities across the EU, the Irish BBEC will coordinate interuniversity programs, facilitating study visits and exchanges and promoting inter-EU access to existing relevant bioeconomy-based programmes.

Key Resources

The Irish BBEC will be coordinated by MTU with the support of IBF. It will be located within the MTU Tralee campus (CIRCBIO offices) and will employ 2 staff members - a programme/centre manager and a community manager. It will have access to the facilities, technology and resources of MTU, CIRCBIO, CBCSW and IBF. The website development, support and hosting will be contracted externally. A data mining tool will be licensed to provide a job seekers portal.

Partnerships and Alliances

MTU will connect the Irish BBEC to its own research groups and clusters such as CIRCBIO and CBCSW and to Kerry County Council and regional state agencies. IBF will connect the Irish BBEC to the mid-west region of Ireland and Tipperary County Council. Both MTU and IBF connect to partners at national and international levels through EU-funded projects.

The Irish BBEC will actively collaborate with:

- Irish 3rd-level educational institutions
- Irish educational institutions in lifelong learning and apprenticeships
- EU partner organisations (primarily BBEC project partners)
- Industry and corporations in Agriculture, Food & Marine sectors
- Government organisations/state agencies
- General public/Civic society

Legal and Regulatory Environment

The Irish BBEC will be part of MTU and as such will operate in accordance with MTU legal and regulatory policies and publications for Governance, Office of the President, Academic, Corporate, Data Protection, Estates, Equality, Diversity and Inclusion, Finance, Health & Safety, Human Resources, and Information Technology.

For the Irish BBEC website, a data mining tool will be used and will require the relevant software licence.

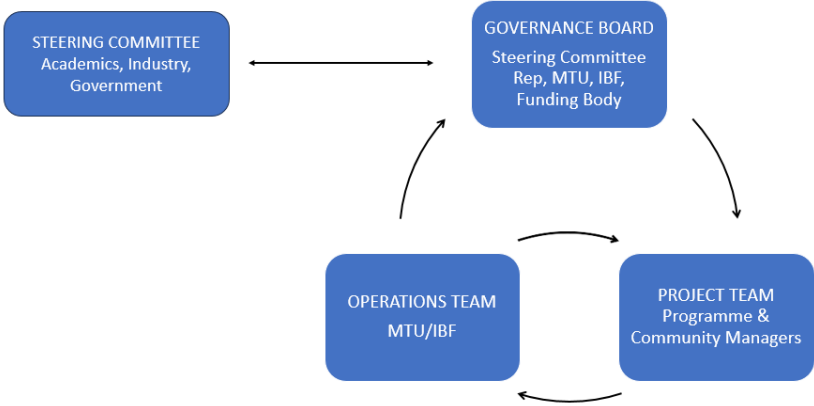
Governance

Major decision-making will come from the governance board while the day-to-day running of the Irish BBEC will be undertaken by the project team under the guidance of the operations team. The governance board will refer to a steering committee (including representatives from government, academia, and industry) which will meet bi-annually to review performance and make recommendations in tandem with the governance board on improvements and innovation/future planning.

The governance board will include MTU, IBF, a representative from the steering group and from the funding agencies involved. The governance team will meet bi-annually (once with the steering committee and once with the operations team).

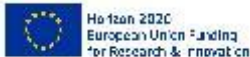
The operations team will consist of representatives from MTU and IBF and will meet on a quarterly basis. These meetings may involve input from or meeting participation from the project team. The project team will consist of a programme manager and a community manager and will meet monthly and report to the operations team.

Stakeholders will be invited to contribute to the decision-making process through participation in working groups, forums and information sharing sessions arranged by IBF and MTU



Risk Assessment

Table 5 below shows a summary of the potential risks and challenges to the viability of the Irish BBEC that have been identified, along with proposed mitigation strategies.



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.

Table 5 - Potential risks and challenges to viability of Irish BBEC along with mitigation strategies.

	Potential risks and challenges to the viability of the Irish BBEC	Mitigation strategies
1	Failure to secure adequate funding	Consultation and active lobbying of relevant bodies to secure funding
2	Competition within Ireland from other bioeconomy-based research/development/educational organisations	Scoping analysis of bioeconomy landscape in Ireland. Inclusion of other bioeconomy-based organisations in the development of Irish BBEC to ensure as wide a range of coverage for the BBEC as possible.
3	Competition within Ireland from other educational institutions	Assessment of course offerings in the education landscape. Identify the competitive advantage of MTU within the sector. Partner with other educational institutions to expand BBEC offering.
4	Lack of engagement with the Irish BBEC website	Cross promotion through partner websites. Use of CIRC BIO dedicated online marketing department to identify target groups for promotion.
5	Lack of demand from industry for apprentices or graduates of courses	Engagement with industry to identify skills shortages and base apprenticeship programmes around these. Propose a certification/sticker scheme for BBEC courses – see 7 below.
6	The time lag between industry demand for skilled workers and the ability of educational institutions to develop and offer relevant courses	Scoping analysis of existing courses on offer in Ireland and EU and identify “best practice” and partnership/franchising opportunities for more rapid roll-out of relevant courses.
7	Failure to attract national interest in courses	Certification scheme/membership of EBU label system/green stickering

The Danish BBEC

Executive Summary

Our mission is to establish and operate a national educational hub in bioeconomy, dedicated to advancing knowledge, innovation, and sustainable practices in the field. Through collaboration, research, and education, we aim to empower individuals and organizations to harness the potential of bioeconomy for economic growth, environmental stewardship, and social well-being.

The Danish BBEC is a hub for the development and marketing of innovative cross-cutting courses, mainly in life-long learning. The courses will be co-created with existing educational institutions and tried out in the first year within the BBEC and after that 'sold' to the most relevant educational institutions.

Market Analysis

We have during the BBEC project collected info via published reports from various Danish sources pinpointing the need for life-long learning in the bioeconomy and the overall education system is now in DK discussing the more practical education where a combination of theory and internships gives more than just the theoretical education.

We have in the BBEC project interviewed 15 education providers and other public/private actors in the field and all confirm the need for the development of new courses 'between silos' on the upcoming need for certification, Life cycle assessments etc. Several have also pinpointed the need to train the teachers i.e., lifting the competencies/inspiring teachers to new angles on their traditional educational business.

The needs are difficult to specify but should be developed together with the BBEC as initiators and working with groups of educational institutions to describe and market new offers.

Value Proposition

The Danish BBEC offers a circular value chain approach from field to fork/to material/to high-value product and back again after refining into fertilizers and 'leftover' carbon. The bioeconomy (left wing of the butterfly model) will be the overarching approach and start to treat and talk about agriculture (and forestry and aquaculture) with new circular bioeconomy terminology that might attract young people to become educated in this direction.

Furthermore, we will offer innovation and incubation as an integrated part of the courses and a high proportion of internships and problem-solving approaches to real challenges from the biobased industry, resulting in demanded 'acting competencies' for the companies.

We will focus on improved competencies and skills within the bioeconomy: production, sourcing, whole circular value chains in an innovation environment/ spirit, and make use of existing facilities, such as GreenLab, Cbio biorefinement plants etc.

The educational hub in bioeconomy provides a distinctive value proposition by **offering comprehensive, cutting-edge education and resources focused specifically on the field of bioeconomy**. Through our programs, we deliver specialized knowledge, skills, and practical experience, equipping students, professionals, and organizations with the necessary tools to excel in the emerging bioeconomy sector.

Key elements of our value proposition include:

1. The BBEC brings together a diverse community of bioeconomy experts, industry leaders, and academics who contribute their knowledge and experience. By accessing our network, individuals and organizations gain valuable insights, guidance, and mentorship from recognized thought leaders in the field.
2. The BBEC fosters collaboration and cross-disciplinary learning, recognizing that the bioeconomy encompasses various sectors, including agriculture, biotechnology, renewable energy, and more. We provide an inclusive environment that encourages the exchange of ideas, innovation, and the exploration of synergies among different disciplines.
3. We emphasize hands-on learning and practical skill development, enabling individuals to apply theoretical knowledge to real-world challenges. Through experiential learning opportunities, industry partnerships, and access to state-of-the-art facilities, our educational hub ensures that learners gain the practical expertise needed to make a meaningful impact in the bioeconomy sector.
4. We prioritize sustainability and ethical practices in the bioeconomy sector. Our educational programs emphasize the importance of environmental stewardship, social responsibility, and the ethical considerations associated with bio-based solutions. By integrating sustainability principles into our curriculum, we empower learners to become advocates for responsible bioeconomy practices.
5. The BBEC serves as a vibrant ecosystem that connects students, professionals, entrepreneurs, and industry stakeholders. Through networking events, mentorship programs, and career services, we facilitate meaningful connections and provide opportunities for internships, research collaborations, and job placements, thereby enhancing participants' career prospects in the bioeconomy field.

Marketing Strategy

For the Danish BBEC, we are in the Blue Ocean, but on the edge of the red ocean, i.e., with less competition, but also somehow in the unknown future. The marketing (and web portal building) is quite a task and expensive and should be developed with participating organisations and links to their websites.

- FBCD outreach is an asset (we know potential customers), we know the 'environment', and we have a communication channel to reach out.
- Close cooperation with participating organizations is a prerequisite.

Some steps in the strategy, when the personnel have been hired, would be to

1. Conduct thorough market research to identify uncovered areas within the bioeconomy field. Look for emerging trends, gaps in current educational offerings, and unmet needs of potential learners and organizations.
2. Develop and disseminate Unique Programs and Curricula that address specific knowledge gaps and align with the demands of the bioeconomy industry. Focus on interdisciplinary approaches, practical skill development, and sustainability-oriented education. Offer specialized courses, workshops, and certifications that are not readily available elsewhere.
3. Build strategic partnerships with key players in the bioeconomy sector, including industry leaders, research institutions, and government bodies. Collaborate on joint initiatives, research projects, and knowledge sharing.
4. Establish a strong online presence through a dedicated website, blog, and social media channels. Share insightful content, research findings, and industry updates. Engage in discussions, conferences, and webinars to showcase your expertise and create awareness of your educational offerings.
5. Tailor Marketing Messages that highlight the unique value proposition of the BBEC. Emphasize the practical relevance, hands-on learning, and sustainability focus of the programs.
6. Target niche audiences within the bioeconomy field, such as professionals seeking upskilling or career transitions, entrepreneurs looking to develop bio-based businesses, or policymakers aiming to understand the potential of bioeconomy.

Revenue Streams

The Danish BBEC is thought of as an association of stakeholders that have a common interest in the field of bioeconomy and educational initiatives.

Key stakeholders are expected to pay a yearly fee for BBEC for running the BBEC basic activities and to provide in-kind contributions in the process of developing new courses.

Educational activities are financed through tuition fees for a single course. There are two different kinds of courses and the revenue stream for each differs.

1. **Standard courses:** Courses that are already available within the existing systems. They will follow the business models of the existing educational institutions whether publicly or privately funded.
2. **Taylor-made courses:** Courses that do not exist but must be developed based on needs identified in the BBEC
 - a. These courses will become a key part of the BBEC. The development and marketing will be costly and the trials of the first 1-2 rounds of the course will be with revenue to the BBEC as it is still a 'risky business' to start up new cross-cutting courses.
 - b. If/when a new bioeconomy course shows positive cash flow – it can be offered to the most relevant educational institutions.

Cost Structure

Developing new cross-cutting courses in Bioeconomy will require varying in-kind contributions of the relevant educational institutions and full attention from the BBEC staff, both in terms of coordinating the development of the courses and especially when describing the learning goals and the formal objectives concerning the national and EU standards.

Financial Projections

We believe that a start capital funded from municipalities and private funds can deliver the basis for the start of the BBEC in Denmark. The initial funding will assume that a viable business model can be developed during years 1-3, and the BBEC thus becoming economically sustainable.

Key Activities

The Danish BBEC has three main activities:

1. **Establish a common continuing education hub** with a web portal across existing education programs (practical and academic, as well as business). The hub will reach out to collaborate with existing providers of relevant courses/offers in the field and be the glue to bind the 'bioeconomy' together as a subject.
 - a. Create a concrete overview of all existing and relevant education programs in Denmark (and the EU) as well as the needs and willingness to pay of companies and course participants.
 - b. Invite collaboration with all relevant actors.
 - c. Create a financial basis for a start-up phase (2-3 years) and contribute with a business plan for long-term commercial viability.
 - d. Hire a project manager and a communicator to build the portal.
2. **Co-create and describe a wide range of course/education offerings** at different levels in the field and identify, describe and provide 'gaps' in existing offerings.
 - a. This part is the core – to develop new interacting and cross-cutting courses and try these out marketing-wise and content-wise on the first generation. Is there a basis to run such a course?
 - b. Courses could have themes such as
 - i. The role of livestock production in bioeconomy
 - ii. The role of straw in bioeconomy
 - iii. Biorefinery and cascading
 - iv. Biogas and pyrolysis plant management
 - v. Green biorefining of grass proteins
 - vi. Algae in bioeconomy
 - vii. Regenerative agriculture
 - viii. Hemp refining for biobased materials
3. **Build an international showcase and matchmaker** in the field.
 - a. Participate in international cooperation on bio-based education centres in Bologna, Hohenheim, Eastern Finland, Ireland, and Poland, each with bioeconomy as a core and specialization.

- b. Make exchange agreements between agricultural schools, forestry schools, academies, and universities for exchanges and reciprocal visits/courses.
- c. Develop recruitment programs for Danish companies - and find students for 'reverse recruitment.'

Key Resources

The proposed structure demands a limited hub for developing and marketing new courses that will rely on /depend very much on the commitment and input from the 'traditional' educational institutions.

- We count on a secretariat/hub of 2 persons in the initial phase (financed by an external source)
- We will develop courses in a series of workshops with business and educational institutions.
- We will test the courses (within the hub) and when ready, the courses will be taken over by existing and relevant educational institutions.

Partnerships and Alliances

We have discussed the proposed structure with the following interested parties – and the partnership is still open.

- Vocational farming schools (Asmildkloster, Bygholm, Kalø, Beder)
- Aarhus University, Roskilde University, Copenhagen University
- Business/commercial educations: Mercantec, Dania, VIA, SEGES Innovation, Skive College.
- Arla, UNIBIO, HedeDanmark
- Municipalities/regional: Viborg, Skive, Central Denmark Region
- Others: GreenLab Skive, Klimafonden Skive

Legal and Regulatory Environment

No major issues. However, as FBCD is not an accredited educational institution, we can (and should) only be the accelerator and the innovating body of new cross-silo educations/courses. We can combine the inputs with business needs and add on an incubation and acceleration aspect for startups.

Governance

We expect most of the above-mentioned institutions to be the founding fathers of the Danish BBEC. We assume that a project (2-3 years) with an advisory board will formally establish the BBEC DK.

The project will be anchored in Food and Biocluster Denmark with the project manager and the CEO of the BBEC being the same person. The governance of the project will follow normal project management procedures in FBCD.

Risk Assessment:

The main risk for the establishment of the Danish BBEC is probably the start capital. Although we have had many positive indications throughout the project regarding the interest, we know by experience that when specific funds are applied many obstacles may appear. The process of raising capital will enter a new phase in Months 24-30 of the project's lifetime.

The second obstacle to sustainability is the financial model. Can we establish a model for developing new courses that work in cooperation with educational institutions? Furthermore, the challenge is to finance the BBEC personnel based on the income from try-out courses. This has not been tried before so we are standing on virgin land.

A third obstacle is also defining the courses that will attract privately funded 'students' and reflect the need of the bio-based industry. An important part of the customers should/can be vocational and high school teachers on life-long learning courses as part of their employment. And when this is running, how can we internationalize the BBEC activities?



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.

The German BBEC

Executive Summary

The German BBEC will serve as a hub for connecting actors between institutions and networks. It will support the creation and adaptation of educational offers by developing a flexible, inter- and trans-disciplinary, tailored, practical-oriented and regional-driven framework for sustainable Bioeconomy at the different educational levels and offerings. As part of the University of Hohenheim, the main target group will be students from bachelor and master programmes: However, professionals and practitioners in the different fields of bioeconomy, as well as biobased companies, governmental institutions and the general public of the region of Baden- Württemberg will be targeted through the different activities of the Centre.

The German BBEC will:

- Support the connection of supply and demand for bioeconomy-related education based on the trends and needs of different societal actors.
- Offer advice and/or consultancy based on a framework for educational formats that respond to the needs of education for current and future social challenges.
- Serve as a platform that connects stakeholders of bioeconomy education in the region and at national and international levels to enhance cooperation between educational institutions, industry, government, NGOs, among other stakeholders.
- Work on social awareness of bioeconomy by inspiring, engaging and communicating topics of sustainability transition to the bioeconomy to society.
- Become an authority on topics of bioeconomy education based on research of directional trends, developments, and challenges.

Market Analysis

In Germany, there are around 3 million employed in biomass-producing and converting sectors, a potential target group of the BBEC. At Baden-Württemberg there is a strong biobased industry from the primary biomass sector, food and feed, pulp and paper, bio-chemicals, biopolymers, phytopharma, textile and clothing, renewable energy and eco-construction corresponding to the 11.62% of the firms in the region by 2014. These companies represent a potential market for one of the services that the centre wants to offer. In general, there is a need for professionals who deal with and move along the value chains and understand their complexity, and who have sustainable and interdisciplinary skills. For this need, the BBEC is connected to the University of Hohenheim with its 8000 students from bachelor and master programs who can be reached through the planned activities. Ideally, some of these students develop needed skills such as communication skills, business skills, and critical and holistic thinking, among others so there are professionals that can create a sustainable transition, and people who can manage this transformation practically.

According to the report Promoting education, training and skills across the bioeconomy (2022), Germany has a total of 168 educational programs in higher education institutions linked to the bioeconomy. While regarding VET, there are offers for topics on agriculture; the manufacture of bio-based chemicals; pharmaceuticals, plastics, and rubber; the manufacture of bio-based textiles; food, beverages and tobacco; and energy, water and waste management. These educational institutions are potential stakeholders for the successful dissemination of the planned activities.

During the interviews and workshops of the project, there was also evident the need to have a stronger connection to technology comprehension and production know-how and understanding of the value networks. The BBEC aims to partially support the network through consultancy services and the connection between different actors of the region. Another clear need is the bidirectional transfer of results from research to the economy, which is supported by the University of Hohenheim and other institutions through innovation spaces and continuous exchange with industry and start-ups.

Value Proposition

The German BBEC will serve as a hub for connecting actors between institutions and networks. It will support the creation and adaptation of educational offers by developing a flexible, inter-, and trans-disciplinary, tailored, practical-oriented and regional-driven framework for sustainable Bioeconomy at the different educational levels and offerings.

Marketing Strategy

The marketing strategy consists of:

- Public relations starting with the current network and visibility activities on the homepage, the newsletter of the university but also social media channels of the university, the BBEC and stakeholders.
- Networking events, personal contacts of the BBEC and University personnel and project proposals
- Online and onsite classes and student fairs.
- Events like science festivals or exhibitions.

Revenue Streams

A description of the major revenue streams BBEC will have, such as tuition fees, grants, sponsorships, or donations. (Summary from WP3.3)

1. Projects budgets: Our main revenue will come from bioeconomy-related projects at regional, national, and European levels.
2. Consultancy services and use of labs and experiments for companies.

Cost Structure:

A breakdown of the costs involved in running the BBEC, including expenses related to facilities, personnel, marketing, and operations.

Item	Cost (euros)
Salaries of two persons for one year (TVL 13, Stufe 3)	120.000
Four laptops and additional devices (mouse, extra screen, keyboard, printer, docking station)	7.000
Office supplies for one year	1.000
Travel and other expenses to build a first package of services for the three Workstreams (communication + network + products + projects)	5.000
Office(s) and its maintenance	3.000
Furniture and office equipment (phone line, internet connection, lighting,)	600
University services: administration, IT, web hosting	50
Secretary salary for BBEC-related activities (10%)	5.000
Software licenses for four laptops	240
Advise and/or services on topics such as procurement, data management, ethics, occupational safety, meeting rooms, human resources management, sports options for employees, among others, marketing and communication through the university social media and website channels	-
Total	141.890

Financial Projections:

No financial projections have been given but according to D 3.3. there is a negative balance over a five-year time frame.

Key Activities

The German BBEC will offer different academic and non-academic activities:

- Innovative courses on bioeconomy topics for master programmes e.g. Projects in Bioeconomy Research
- Connection with industry through a series of lectures in which different companies and startups working on bioeconomy will present what they do and have conversations with the students about their challenges, barriers, and opportunities. This would be a new potential course/ series of lectures to be offered.
- Tools for teaching bioeconomy-related topics to kids
- Learning modules for farmers
- Online course on Bioeconomy-related topics
- Support students to connecting with industry actors in the framework of theses at the bachelor and master level.
- Exhibition on Bioeconomy for the public
- Books and papers on bioeconomy
- Certification to master students to certify the T-shape profile and inter and transdisciplinary profile.

- Consultancy services for biobased companies

Key Resource

An overview of the resources required to operate the BBEC, including personnel, facilities, equipment, labs and technology.

- Dynamic, interdisciplinary working team
- Office, furniture, maintenance
- Administrative staff
- Laptops, office equipment and office supplies
- Network at regional, national, and international level (diverse stakeholders)
- Labs at the University of Hohenheim
- Professors and researchers of the University of Hohenheim
- Dissemination material (videos, social media, informative materials and examples)
- Website: information and education platform

Partnerships and Alliances

A description of the partnerships and alliances the BBEC will form with other organizations, such as academic institutions, industry associations, or community groups.

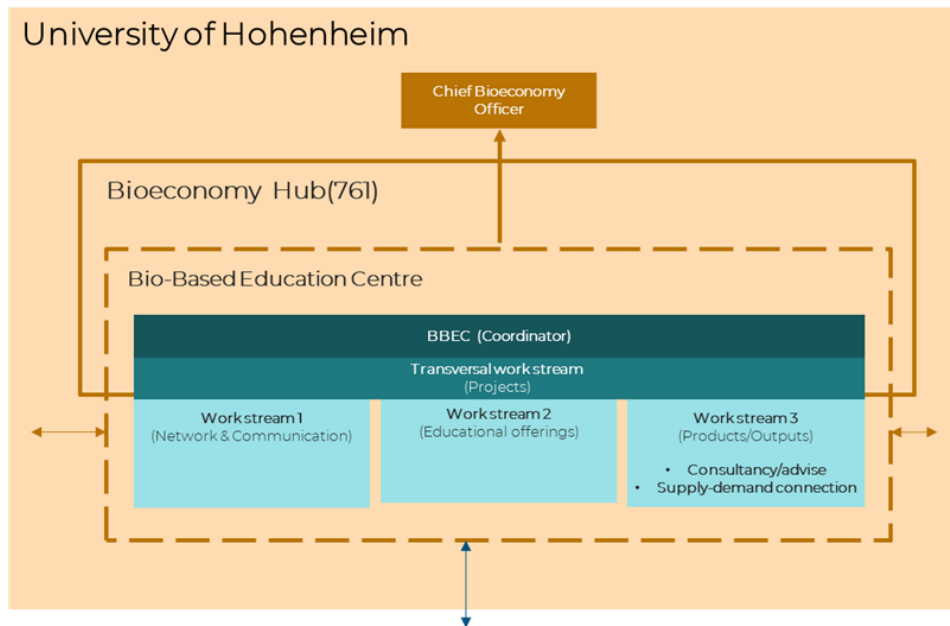
- European Bioeconomy University (EBU): BOKU and AgroParisTech
- German educational and training institutions
- Governmental institutions at the regional level: Ministry of Environment, Ministry of Rural Affairs and Consumer Protection, Federal Ministry for Economics Affairs and Climate Action, State Institute for Agriculture, Nutrition and Rural Areas
- Chamber of Commerce and Industry (IHK)
- Science Center Experimenta
- Non-governmental Institutions
- Research Institutes at national level
- Accelerators, start-ups and industry actors

Legal and Regulatory Environment

As part of the University of Hohenheim, the German BBEC will be part of the University of Hohenheim and therefore will be a subordinate institution keeping the public distinction of the superior institution (University of Hohenheim). It will be then legally represented by its President and the same ethical and legal framework will govern the BBEC.

Governance

The German BBEC will be created within the University of Hohenheim and therefore it will be embedded into the institutional setting and infrastructure depicted in the figure by the dotted line. The BBEC then will have a direct connection with all the internal academic and administrative institutes and parties of the university shown by the bidirectional arrows but especially within the Bioeconomy hub. The connection with external stakeholders is shown by the blue arrow.



Risk Assessment:

An evaluation of the potential risks and challenges the BBEC may face, such as competition, funding, or student retention.

1. Funding: to maintain the BBEC, the continuous application to projects is essential. There is a risk if no projects are funded what means that no salaries could be paid.
2. Student attraction: Some programmes or activities require the application of students. Although it is normally not the case, the lack of applicants represents a potential risk for some of the activities.
3. Being part of the university, the dissemination and communication activities of the BBEC could be difficult. As parallel activities are happening internally related to bioeconomy, there is a diverse communication scheme of the university and the different projects, and it could be complicated to unify all of them and there is a risk of missing some of the activities.

