BBioNets

Boosting the adoption of Bio-Based Technologies

DELIVERABLE D2.1

Methodological framework for knowledge compilation

CREA

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Main Authors	Roberto Cagliero - CREA Francesca Moino – CREA Patrizia Borsotto - CREA		
Contributors	Ilaria Borri, Mara Lai, Anna Vagnozzi, Francesca Giarè – CREA Iakovos DELIOGLANIS -FOCUS Carmen Girón Domínguez - MTU		

Peer reviewers

WP Leader	Carmen Dominguez - MTU
WP Leader	Anna Karpinska – TEAGASC
Coordinator	Carmen Girón Domínguez - MTU

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Table of Abbreviations

Abbreviation	Description
BBTs	Bio-Based Technologies
D	Deliverable
EU	European Union
FANs	Forest and Agriculture Networks
GA	Grant Agreement
KET	Key Enabling Technologies
OGs	EIP AGRI Operational Groups
RR	Representative Regions
T	Task
WP	Work Package

Executive Summary

This document is the "*Methodological framework for knowledge compilation*" and represents the respective deliverable (D2.1) within the context of the BBioNets project funded through the European Union's Framework Programme for Research and Innovation Horizon Europe under Grant Agreement No 101133904.

BBioNets will constitute a thematic network that will rely on, promote, and further advance the work carried out by EIP-AGRI Operational Groups (OGs) with respect to management and/or processing of agricultural and forest biomass with Bio-Based Technologies (BBTs). Within the scope of BBioNets, various activities are undertaken, encompassing the gathering, generation, and/or manipulation of data. The goal is to boost the (re)definition of value chains, stimulating cross-fertilisation beyond borders, and bringing Europe to the forefront of farming, forestry, and bioeconomy with economically viable and sustainable practices.

In BBioNets projects, we delimit the field of Key Enabling Technologies (KETs) to a more circumscribed set; we mean Bio-Based Technologies (BBTs) as it relates to the management and/or processing of agricultural and forest biomass with Bio-Based Technologies. This consists firstly of the development of a methodology for knowledge compilation (guidelines and relevant templates) and the creation of an inventory to provide easy access to all information about available BBTs collected from recently completed and ongoing EIP AGRI Operational Groups (OGs) and other EU-funded projects & initiatives. In this light, we have the following objectives:

- Develop a methodology to select and categorise relevant projects/initiatives
- Creation of an inventory to assemble all information collected by consortium partners on BBTs that could address farmers' and foresters' needs in Representative Regions (RRs).

Identifying specific criteria and parameters is a highly relevant step in describing, understanding and implementing BBT-related practices, especially at a regional level. In addition, the awareness of the economic and environmental benefits associated with BBTs allow to draw a clear picture of the current state of agricultural/forestry practices and compile them in a comprehensive description. The results of the inventory will relate the identified BBTs (OGs in progress and from other EU-funded projects and initiatives) to selected themes and provide a valuable set of information for a comprehensive description of agricultural/forestry practices and to guide the development of a dedicated BBT assessment tool and material at a later stage (see SO3)

More specifically:

- identification of descriptive fields
- identification of assessment fields
- identification of mandatory fields, closely related to BBTs assessment tool (TASK2.2)
- identification of criteria and parameters to make the information collected usable (e.g., drop-down menus, estimates, quantitative data).

In other words, we are expected to deliver a methodology for selecting BBT-relevant information and providing easy access to all BBTs' collected data.

1 Introduction

Deliverable 2.1 is the first outcome of Task 2.1 (T2.1) which focuses on defining a methodology for knowledge compilation on Bio-Based Technologies (BBTs). The specific activities are outlined in the BBioNets Grant Agreement and can be summarised in below highlighted points:

Task 2.1 BBioNets inventory and knowledge collection

2-stage creation of an inventory to assemble all information collected by consortium partners:

1st stage: development by CREA of a methodology (D2.1, M4) by CREA involving **i)** setting out criteria and parameters for the selection of BBT-relevant information by all partners; indicative parameters to be considered: bioeconomy fields covered/ value chains, processes, cost/ outcomes and the final product (energy production, bio-based products, compounds, etc.)/ geographical identification/ biomass wastes and residues utilisation/ whether it is a carbon capturing practices, etc., and **ii)** detailing all partners' contribution, procedures, timing and templates for the screening and mapping of BBTs

2nd stage: mapping BBTs already featured in both Operational Group projects and projects/initiatives funded by other national and European programmes. Taking into consideration farmers' /foresters' information and support needs (T1.2) and the comprehensive description of current practices (T2.3), the consortium will look for BBTs that could address farmers' and foresters' needs in RRs. The inventory (pool of existing knowledge) will be enriched throughout the project to identify and take into account the work of any relevant future OGs and projects, and will be made publicly accessible on the BBioNets online knowledge platform (T3.2).

D2.1 document aims to set out criteria and parameters for the selection of BBTs and should be used as a guide or handbook for identification of BBTs. Target readers and users of D2.1 are first the partners in the project who will identify BBTs during the project and then the external users interesting to collect information on how BBTs are identify.

Support farmers and foresters in adopting BBTs to raise awareness of social, economic and environmental benefits of BBTs is one of the main goals of the BbioNets project.

This report comprises four chapters along with references and is organised as follows:

Section 1: Introduction: includes the project information and briefly presents the structure of deliverable as well as issues concerning deliverable scope, objectives, how it is the function in the project and the target.

Section 2: Methodology: This section outlines the research method used to produce this deliverable. It specifically introduces details on the background and pathway to define the methodology for BBTs' collection.

Section 3: Guide: provides an overview of the procedures to identify OGs and other projects that deal with BBTs, timing and templates for mapping BBTs.

Section 4: Conclusion The last section summarises conclusions on identification of criteria and parameters for the selection of BBTs that could be adopted by farmers and foresters. References are located after this chapter.

Finally, the **Annexes** of the D2.1 include **(i) a matrix tool to collect BBTs with some Italian OGs' BBT already gathered as an example; (ii) a questionnaire and informed consent form; (iii) xls tools.**

2 Methodology

The methodology developed to achieve the expected task outcomes will be outlined within this chapter.

2.1 Background

TASK 2.1 started from a literature review that provides definitions and classifications of BBTs to establish a methodology that identifies criteria and parameters for the selecting of BBTs. BBTs constitute a subset within a broader category of Key Enabling Technologies (KETs) that according to the European Commission are technological innovations with the potential to foster global competitiveness that act as enablers for progress in various fields, helping to transform production methods, enhance efficiency, and promote sustainable solutions. KETs are typically characterised by a cross-cutting impact on multiple industries and may include micro/nano-electronics and photonics, life-science technologies, Artificial intelligence, advanced materials, advanced manufacturing and digital security and connectivity (European Commission, 2018).

KETs serve as a strategic foundation for advancing Bioeconomy goals, facilitating the shift from fossil to biological resources and optimizing process efficiency, ultimately promoting sustainable industrial innovation. This integrated approach, which considers socio-economic aspects and stakeholder perspectives, contributes to shaping a comprehensive framework for sustainable progress. Therefore, KETs emerge as practical solutions for industries seeking to enhance their performance, both in environmental and economic terms (Laibach et al., 2019).

KETs adopting bioeconomic strategies are defined explicitly defined as bio-based technologies, representing a subset that incorporates technologies or practices that utilize non-food feedstock, circularity principles, or a combination of them to create diverse products. These technologies focus on the sustainable utilization of biomass through advanced processes, playing a role in transitioning towards a bioeconomy that promotes global competitiveness and enhances efficiency in the production of goods and services (Escobar and Laibach, 2021).

Concerning the classification, a recent study by Escobar and Laibach (2021) proposed a scheme to categorise KETs based on the feedstock employed (plant residues and perennials, designer crops, algae, or biological waste) or the underlying technological configuration (enzyme/microbial assisted processing or biorefineries). The selected KETs refer to technologies that either boost agricultural productivity and the use of non-food biomass or increase the efficiency of biomass conversion and waste stream recycling. Based on this, a two-tier approach was proposed, in which selected KETs were firstly classified into two main categories, namely the type of feedstock employed (F) and the technological configuration adopted (C) (Figure 1).

Category	Name	ID	Description
Type of Feedstock (F)	Crop residues and perennial plants	F1	Agricultural residues from dedicated crop production with no value-added use or treated as waste, e.g. wheat straw or sugarcane bagasse Non-edible biomass such as perennial grasses or lignocellulosic crops
	Designer crops for optimised biomass content	F2	Genetically engineered or systematically bred plant varieties to extract or produce high value-added bio-based products, e.g. phytopharmaceuticals
	Algae biomass	F3	Marine biomass obtained from cultivated macro- or microalgae
	Waste or recycled material	FC	Processes using waste or recycled material in closed-loop approaches
Technological configuration (C)	Enzyme/ microbial assisted processing	C1	Fermentation, catalytic or other processes that facilitate or enable the utilisation and conversion of biomass for further uses
	Biorefineries	C2	Integrated processing steps to produce a spectrum of products from biomass, including materials and energy

Figure 1: Categories and sub-categories of KETs (Source: Escobar and Laibach, 2021)

In BBioNets project, we delimit the field of Key Enabling Technologies (KETs) to a more circumscribed set; we mean Bio-Based Technologies (BBTs) as it relates to the management and/or processing of agricultural and forest biomass with Bio-Based Technologies.

2.2 The methodological path

The objective of this paragraph is to describe how the parameters for the inventory were chosen. It describes also the path followed in order to assess the final list of parameters. After the crucial point of identifying in a clear and shared manner the BBTs (Escobar and Laibach, 2021), the very next step was to pick and choose criteria and parameters with the ability to describe and categorise BBTs. In our opinion the starting point of this step was coming out from the peculiar literature about BBTs.

The approach is to conduct a task easily and to develop a model that would be easily understood and useful for the next steps of the project. For this reason, it was decided to construct a matrix using an easily fillable Excel file as support that consortium partners could easily fill to build an inventory.

The process of identifying and choosing variables to be used to define and characterise BBTs has followed a multilevel path (Figure 2).

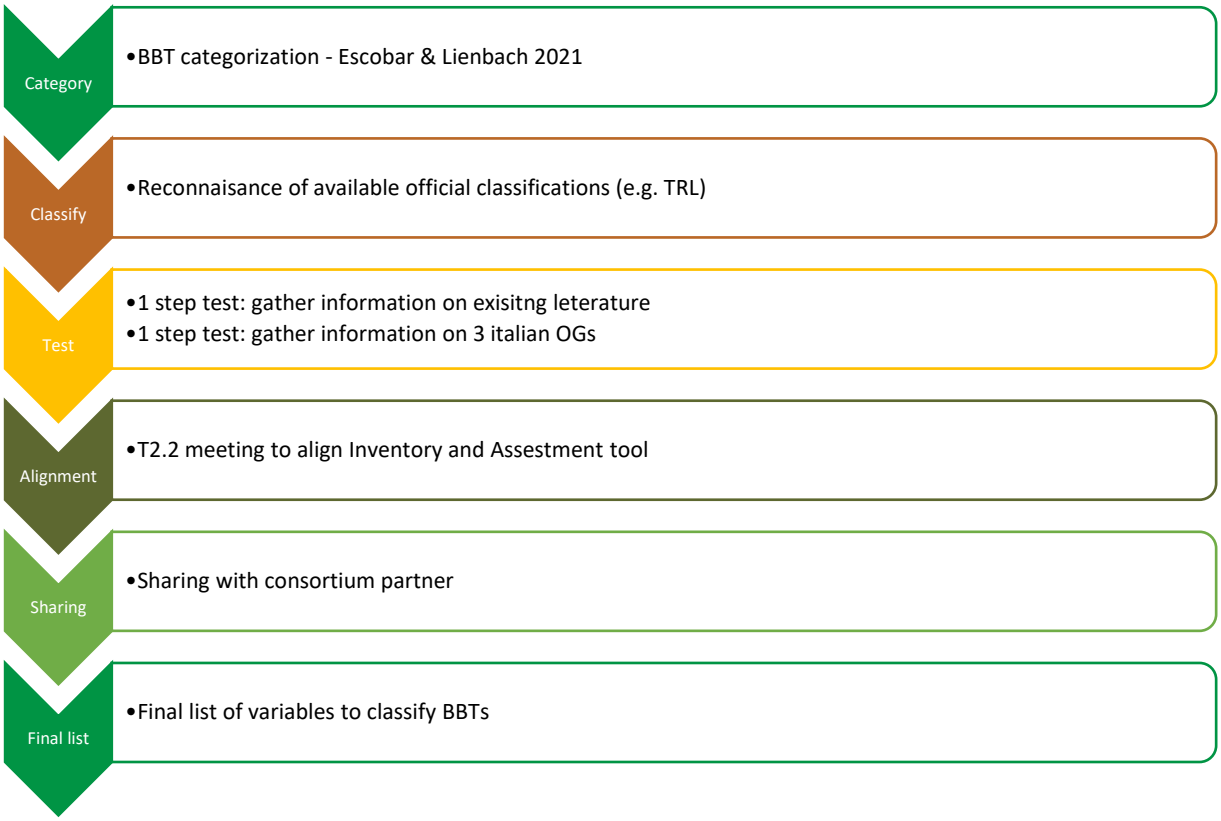


Figure 2: Pathway for defining the matrix.

In the info phase (Category + Classify), references from different sources (Escobar and Laibach categorisation, EIP-AGRI database[1], Italian OG database[2] and Task 2.2 assessment tools first released) were used to identify a first group of criteria and parameters to classify BBTs which have been organised in a matrix (Figure 3).

This **first** matrix that contains few attributes, and it aims to collect descriptive data (title, year, language, type of publication, abstract) and specific information about the three dimensions of sustainability (economic, social, environmental), bioeconomy fields involved (according to Escobar and Laibach, 2021), biomass, waste or residue utilisation, outcomes and value chain, was tested with several literature documents (1 step Test). This test phase highlighted several corrections to be made in the light of the final matrix.

[1] https://ec.europa.eu/eip/agriculture/en/eip-agri-projects/projects/operational-groups.html

[2] https://www.innovarurale.it/it/pei-agri/gruppi-operativi/bancadati-go

No		Bioeconomy fields	Crop residues and perennial plants F1
Author(s)			Designer crops for optimised biomass content F2
Title			Algae biomass F3
Year			Waste or recycled material FC
Type of publication			Microbial assisted processing C1
Geographic Scope			Biorefineries C2
Language of publication		Biomass wastes and / or residues utilisation	
Abstract available in English (Yes/No)		Outcomes and final product	
key word *		value chains	
Sustainability	Economic	Comments	
	Social	Coherence & usefullness	
	Environmental	Note	
		Accessible at	

Figure 3: First classification matrix (prototype).

A reviewed and improved matrix, both in the choice of attributes and format definition, (Figure 4) was tested with 3 Italian OG and some issues emerged and were discussed to align the product of Task 2.1 (inventory) with cognitive and informational needs required by the following steps in the project (TASK 2.2, assessment).

Field	Specification
No	
Code	
MS (EuroStat)	dropdown
Region (EuroStat)	Code
Reference sector (NACE + FADN?)	dropdown
Name	
Acronym	
Accessible at	(URL, path in project repository, etc.)
Topic *	dropdown
Needs	narrative synthesis
Objective	narrative synthesis
Budget	euro
Main source of funding	dropdown
Period	
Duration	Months
Partners	Num.
Type of partners (Guidelines for data on EIP OG)	dropdown
Focus Area (RDP) / OS	dropdown
Geographic Scope (country, EU, etc.)	dropdown
Status	dropdown

Field	Specification
Key Word (Guidelines for data on EIP OG)	dropdown
Categories: Bioeconomy fields (see ref 1)	Crop residues and perennial plants F1
	Designer crops for optimised biomass content F2
	Algae biomass F3
	Waste or recycled material FC
	Microbial assisted processing C1
	Biorefineries C2
Biomass / Biomass residues / wastes	dropdown
Outcomes and final product (energy production, bio-based products, compounds, etc.)	dropdown
Value chains	(Y/N)
C Sink	(Y/N)
TRL Commission Decision C(2014)4995	dropdown
Specifc Actions	narrative synthesis
Sustainability - Impact (High -- Low) 4-point scale	eco
	socio
	envi
complexity of the process (High--low)	4-point scale
Intended user / conditions of access	narrative synthesis
Added Value	4-point scale
Overall judgement	coherence BB net project (red, yellow, green lights)

Figure 4: Second classification matrix (prototype).

In particular, the following table shows the open issues and solutions that were discussed in a thematic meeting with the Task 2.2 group. The aim of this meeting was to align the methodology to build the BBTs' inventory to the assessment tool; in particular the object of the discussion was about the innovation level of the project, the primary key of classification, we mean about project or action level, the intended users, the statement of problem and the Budget level.

Table 1: Open issues and solutions identified during the meeting of alignment between Task 2.1 and Task 2.2

Open issues	Solutions
Innovation in which innovation's phases are BBioNets interesting? Research vs actual application	Technology Readiness Level h2020-wp1415-annex-g-trl_en.pdf (europa.eu)
Sort Inventory by OG or projects or by actions or WP/Task	By actions or WP/Task to identify BBTs
Indented users	There are some conditions users of access (e.g. if the BBT is very linked to plain cultivation is a limit for mountain cultivation)
Needs of innovation (why)	Statement of problem that we have face
Budget	Task 2.2 needs Investment costs, Operational costs, etc. on BBTs
Sustainability	Three dimensions (economic, social, and environmental) + scores based on the estimation of which kind of attributes the project is in (1;2;3) as suggested by TASK 2.2
* Required fields	Mandatory fields
Dropdown menu	Official classifications (every time is possible) eg NACE (A section), OG EIP-AGRI Guideline, TRL

The final matrix is composed of 6 parts and three more general information (No. Id, Code, Coherence with BiBionet):

1. **OG attributes**: Member state OG/PROJECT; Geographical Indication, Name, Acronym, and link;
2. **BBT attributes**: description, needs, objectives in narrative way, reference sector, main source of funding, partner, duration, geographical scope, and focus area (for RDP);
3. **BBT categorisation**: Bioeconomy fields (Escobar & Lainbach, 2021), Feedstock, Outcomes, and final product;
4. **BBT implementation**: Processing Capacity, Mobility, Value chains, C Sink, Intended user / conditions of access, Complexity of the process;
5. **BBT expected results**: final user, sustainability (for each category how many attributes can face in your project), add value;
6. **BBT cost**: Equipment maintenance costs (€), Investment cost (€), Operational costs (€), Return of investment (in € and year).

The matrix was shared with the consortium partners and several recommendations were collected, especially on the determination of field attributes: whether to use drop-down menus, the need to determine the name of fields more precisely, the possibility of keeping native language or English fields, or the integration of certain dimensions.

After this phase, on 31st January 2024 we fixed a meeting with partner consortium in order to share the final matrix and to discuss the observations received (Figure 5).

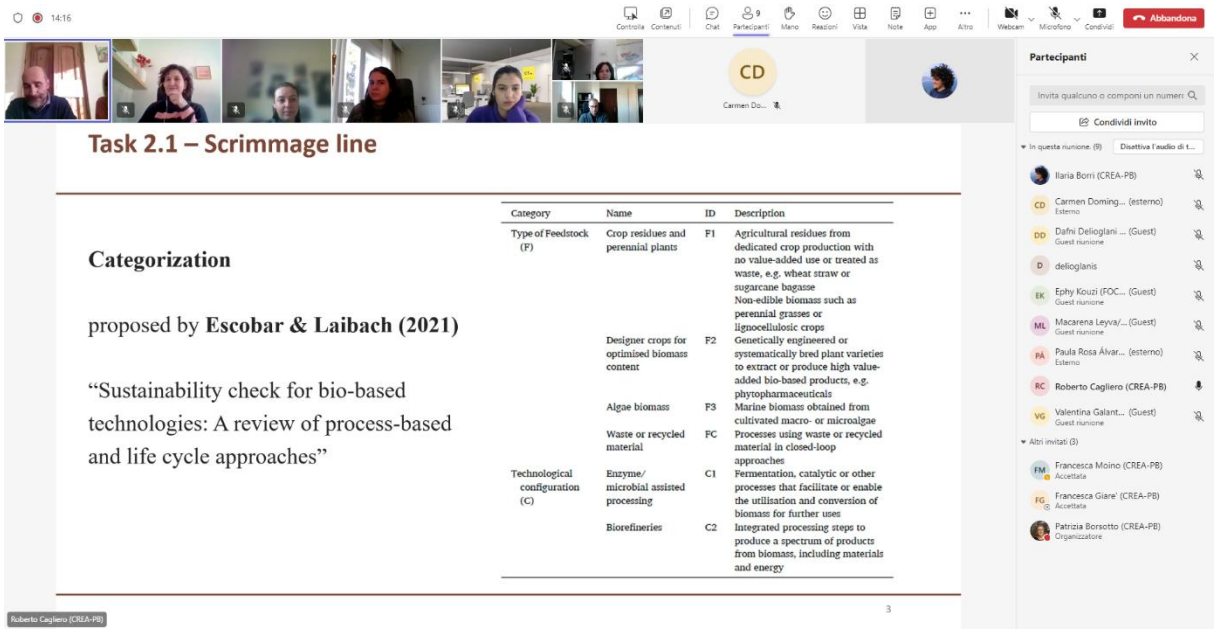


Figure 5: Consortium meeting

No more observation, than that in Table 2. After the meeting CREA has tested the matrix with 3 Italian OGs.

3 Guide

The guide has the aim to support partner in the collection of BBTs.

The goal of T2.1 is the **creation of an inventory** to provide easy access to all information about available BBTs collected from recently completed and ongoing OGs and other EU-funded projects & initiatives. This document supports partners in identifying OG and projects, as well as in determining the methods for collecting data. The final users of inventory will be farmers and foresters.

3.1 Information to be collected / Data entry

A data collection tool was developed by CREA to gather information on BBT and subsequently distributed to all FAN partners, facilitating their completion of the tool. The tool is easily understandable as well as useful for further steps to complete. The identified attributes are given below in an aggregate manner by dimension of analysis.

Table 2: Attributes and variables for the inventory

No.	Main Dimensions	Fields/Variables
1	OG / Project attributes	MS OG/PROJECT Region OG/PROJECT Name OG/PROJECT Acronym OG/PROJECT OG/PROJECT Accessible at...
2	BBT' attributes	Description BBT Name BBT Reference sector Needs / Problem statement Objective Main source of funding Period Duration Partners Type of partners Focus Area (RDP) / OS Status Geographic Scope
3	BBT' Categorisation	Key Word Categories: Bioeconomy fields (Escobar & Lainbach, 2021) Feedstock Outcomes and final product
4	BBT' Implementation	TRL Processing Capacity Mobility Value chains C Sink Intended user / conditions of access Complexity of the process

5	BBT' expected effects	Final user Sustainability eco Sustainability envi Sustainability socio Added value
6	BBT' costs	Equipment maintenance costs Investment cost Operational costs Return of investment

In addition, we propose an overall assessment of consistency and coherence with the objectives of the BBioNet project. The abovementioned fields should be provided with the following criteria below:

Table 3: Criteria used for field's type

Specification Approach	It means…	e.g.
Dropdown	Use of preset menus from which to select. Fields are blocked	Geographic Scope (Local; regional; MS, Eu; Europe, Global)
'Narrative synthesis	Open field, where to enter a brief narrative of the theme considered. It could become a drop-down menu field, cataloguing the already collected responses.	Needs / Problem statement
Quantification	This is a field that provides for the entry of indications of a quantitative nature (cardinal or otherwise) such as number, euro, tonnage, ...	Investment costs (Euro)
Categorification	It provides the ability to indicate 1 (or more) characteristics of a field; selection is in Y/Y mode and can allow multiple choices,	Type of partner (Farmer; Forester; Advisor; Researcher; NGO; Training organization; Processor or retailer; Consumer; PA + LAG; Other)
Point scale	It is an assessment of a limited number of dots, preferably an even number, which brings a more polarisation	Complexity of the process
Traffic light	This is a very qualitative assessment that is categorised on the colours of a traffic light: green, yellow and red.	'Overall assessment on the coherence with BBioNet project

The final matrix for collecting inventory is in Appendix 1.

3.2 Data collection

BBioNets will collect and analyse the innovative solutions identified and spread by EIP-AGRI Operational Groups (OG), along with results of relevant EU-funded projects and initiatives that produce innovation useful to respond to farmers' and rural stakeholders' problems.

Information regarding the OG will primarily be sourced from online repositories. In cases where some of the required information is not available in the online repositories, it will be necessary to directly contact the OG partners who will be presented with a questionnaire (Appendix 2).

3.2.1 Repositories

The OGs' information can be found in the EIP-AGRI database and in some national repositories:

Table 4: List of OGs' repository

FAN	Link	Metadata
EU	Projects | European CAP Network (europa.eu)	English. Free text search and for specific items: Project Keywords Project Type Main funding source Project Identification Project Status Geographical location Years Topics
Italy	www.innovarurale.it	Native language. In the filter it's possible to identify OG that deal swith BBTs
Ireland	StoryMapJS: EIP-AGRI Operational Group Projects - Ireland (knightlab.com)	Map
Spain	Grupos Operativos (redruralnacional.es)	Native language. In the filter it's possible to identify OG that deal with BBTs
Poland	Szukaj partnerów SIR (cdr.gov.pl)	Native language/English.

FAN	Link	Metadata
		In the filter it's possible to identify OG that deal with BBTs
Czechia	Eagri	Native language/english. In the filter it's possible to identify OG that deal with BBTs
Greece	-	-

The other European type of project could be:

- Project under the **LIFE Programme** that is the EU's funding instrument for the environment and climate action. : LIFE 3.0 - LIFE Project Public Page (europa.eu)
- Projects with a **multi-actor approach** (MAA) focus on seizing opportunities or finding solutions to real needs, problems and challenges that farmers, foresters or rural communities ('end users') are facing. Multi-actor projects: scientists and farmers creating solutions together | EIP-AGRI (europa.eu)
- **Thematic networks** are multi-actor projects that collect existing knowledge and best practices on a given theme to make this available in easily understandable formats for end users such as farmers, foresters, advisors and others. Thematic networks list | European CAP Network (europa.eu)

Other European project databases can be found in the following table:

Table 5: List of EU projects' repository

Subject	Link	Note
BIO4AFRICA catalogue of bio-based technologies	https://www.bio4africa.eu/technologies/technology-catalogue/	Catalogue of bio-based technologies that have been screened for their potential to support circular agri-food systems in rural African communities and create opportunities to diversify farmer incomes.
Bio-based technologies to valorise wastes	https://repositorio.iica.int/bitstream/handle/11324/12942/BVE20109022e.pdf?sequence=1&isAllowed=y	Spanish language

Subject	Link	Note
Power4Bio catalogue of solutions	https://power4bio.eu/wp-content/uploads/2020/05/POWER4BIO_D3.3_Catalogue_with_bio-based_solutions.pdf	PDF
Enabling EU project	https://atlasbestpractices.com/	H2020 project ENABLING has developed the following platforms to facilitate communication and enhance the development and processing of biomass material.
AGRI4VALOR outputs	https://www.teagasc.ie/media/website/crops/forestry/research/AGRIFORVALOR_article_090518.pdf	PDF
AGRI4VALOR outputs	https://www.teagasc.ie/media/website/crops/forestry/research/AGRIFORVALOR_3-regional-innovation-and-business-case-studies.pdf	PDF
COOPID Success cases	https://interactiveplatform.coopid.eu/#portfolio	The COOPID project has selected, visited and analysed a series of successful examples of circular business models in the EU agri-food sector.
Nova Institute's map of commercialised biorefineries	https://renewable-carbon.eu/publications/product/biorefineries-in-europe-map-2017-%e2%88%92-additional-information/	Biorefineries in Europe Map 2017
databases of IEA Task 42 Biorefinery	https://task42.ieabioenergy.com/databases/#:~:text=The%20Task%2042%20Global%20Biorefineries,EU%20projects%20and%20national%20Statistics.	The Task 42 Global Biorefineries Atlas portal (WEB GIS) includes data from several information sources, such as JRC, IEA Bioenergy, BBI, DOE, EU projects and national Statistics.
CBE-JU funded projects	https://www.cbe.europa.eu/projects	List of Circular Bio-based Europe Project

Other National project databases can be found in the following table:

Table 6: List of National projects' repository

FAN	Link
Italy	Banca dati della ricerca in agricoltura (innovarurale.it)
Ireland	https://biorbic.com/flagship-research-programmes/
	https://biorbic.com/new-outputs-page/
	https://t-stor.teagasc.ie/
	National research repositories: https://www.tusla.ie/research/research-repositories-and-networking-sites/
	DAFM Funded projects dashboard: https://app.powerbi.com/view?r=eyJrIjoiYjYzYzBjNGUtOTdhMC00YzViLTk2MzYtNzI5ZWEzYTAxYTQ4IiwidCI6IjA2YTk0YWNkLWRiZGMtNGU0My1hZGY4LTE0Nzg2MGM3ZmRhMyIsImMiOjl9
	https://www.gov.ie/en/publication/2696e-dashboard-and-previously-funded-projects/
	Research Projects Final Reports - Forestry: https://www.gov.ie/en/publication/ac66f-research-projects-final-reports-submitted-post-january-2021-forestry/
	Research Projects Final Reports - Agriculture: https://www.gov.ie/en/publication/642c0-research-projects-final-reports-submitted-post-january-2021/
	Bioeconomy projects funded by the department of agriculture and forestry: https://assets.gov.ie/98665/710abf64-5d5b-4f41-8d35-128b38551a71.pdf
	DAFM CO-FUNDED PROJECTS: https://www.gov.ie/pdf/?file=https://assets.gov.ie/242487/f7c6acac-1dde-43e6-939f-4b20336c239c.pdf#page=null
	CORDIS SEARCH with IRISH PARTNERS: https://cordis.europa.eu/search?q=contenttype%3D%27project%27%20AND%20frameworkProgramme%3D%27HORIZON%27%20AND%20relatedRegion%2Fregion%2FeuCode%3D%27IE%27%20AND%20%2Fproject%2Frelations%2Fcategories%2FeuroSciVoc%2Fcode%3D%27%2F27%2F79%2F481%2F%27%2C%27%2F27%2F81%2F30021%2F%27%2C%27%2F27%2F81%2F495%2F%27%2C%27%2F27%2F83%2F503%2F%27&p=1&num=10&srt=Relevance:decreasing
	https://cordis.europa.eu/search?q=contenttype%3D%27project%27%20AND%20frameworkProgramme%3D%27HORIZON%27%20AND%20relatedRegion%2Fregion%2FeuCode%3D%27IE%27&p=1&num=10&srt=Relevance:decreasing
Spain	https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fwww.mapa.gob.es%2Fes%2Fdesarrollo-rural%2Ftemas%2Finnovacion-medio-rural%2F124proyectosinnovadoresaei-agrisupra-autonomicospndr2014-2022_tcm30-653712.xlsx&wdOrigin=BROWSELINK
	https://www.cdti.es/sites/default/files/2023-12/resolucion_definitiva_trans_misiones_2023_firmado.pdf
	https://www.cdti.es/sites/default/files/2023-12/resolucion_definitiva_trans_misiones_2023_firmado.pdf
	https://www.mapa.gob.es/es/desarrollo-rural/temas/innovacion-medio-rural/dosier_proyectos_innovacion_digital_esp_tcm30-671808.pdf
	https://www.mapa.gob.es/es/desarrollo-rural/temas/innovacion-medio-rural/dosier_proyectos_innovacion_digital_esp_tcm30-671808.pdf
	https://redpac.es/sites/default/files/documents/Dossier%20Improvements%20in%20Forest%20Management.pdf
Poland	n.d.
Czechia	https://starfos.tacr.cz/
Greece	n.d.

3.2.2 Questionnaire

The questionnaire should be used where the online repository lacks all the information to fulfil the inventory. In the Appendix (ii) there is a questionnaire we proposed considering the information that we believe is most difficult to find online, primarily regarding the costs associated with BBTs. The questionnaire can be adapted by the interviewer according to the information needed to fulfil the inventory. It is important to emphasise that the interviewed partners will need to complete the consent form in Appendix (ii).

3.2.3 Timing and modality to fill the matrix

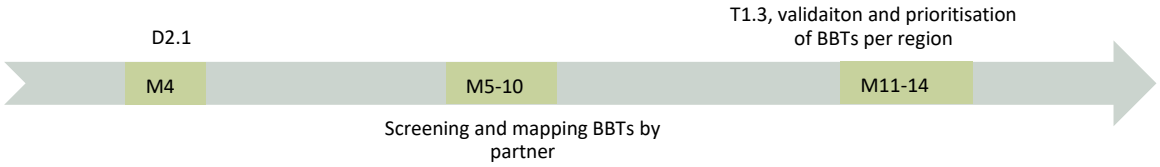
The inventory will be an excel file whose structure is directly analogous to that described in the previous chapter. Each partner should download a blank copy of excel file and fill it remotely following the compilation methods described above (free fields, drop-down menus, etc.). Completed file could be send to CREA. The file excel will also be available on the shared drive where it can be reloaded filled in by the partners.

Some aspects need to be highlighted: the "No.id" field (counter) must be filled following the provided instructions, while the "code" field (unique identification code of the BBT) is a formula activated during the insertion of a new survey row when calculation fields are filled; in fields of the "Narrative synthesis" type, a brief and simple description is requested, as much as possible; fields related to monetary estimates and budgets can also indicate the magnitude of the issue in an indicative manner.

Each partner is required to fill in the inventory, following the guidelines in this document, at least 5 BBTS on at least 3 different projects. Any additional experience inexpert in the inventory represents an added value to the project and is welcome.

The timeline for compilation is outlined in the following flowchart. we can expect compilation results from partners by mid-May 2024.

The CREA group, after conducting a quality assessment, may request explanations or suggestions, which can be directly reintegrated online if minor. However, in the case of substantial changes, exchanges can also take place via email, and CREA researchers will proceed with any necessary corrections.



In any case, partners can contact CREA researchers for any doubts and clarification needs.

4 Conclusions

The methodology for identifying criteria and parameters for the selection of BBTs that foresters farmers and foresters could adopt has has been followed a multilevel path. We are starting from the Escobar and Laibach, (2021) classification of Key Enabling Technologies (KETs) namely by the type of feedstock employed (F) and the technological configuration adopted (C). In BBioNets projects we delimit the field of Key Enabling Technologies (KETs) to a more circumscribed set; we mean Bio-Based Technologies (BBTs) as it relates to the management and/or processing of agricultural and forest biomass with Bio-Based Technologies. The approach is to conduct a task easily and to to develop a model that would be easily understood and useful for the next steps of the project. For this reason, it was decided to construct a matrix using an easily fillable Excel file as support that could be easily filled by consortium partners to build an inventory.

The final matrix is composed of six parts and three more general information (No. Id, Code, Coherence with BiBionet): OG attributes, BBT attributes, BBT categorisation, BBT implementation, BBT expected results and BBT cost. To assess the consistency and the coherence with the objectives of the BBioNet project we provide some criteria such as dropdown approach, 'Narrative synthesis, quantification, Categorification, Point scale and traffic light.

The identification of data used repository that contains the innovative solutions identified and spread by EIP-AGRI Operational Groups (OG) along with results of relevant EU-funded projects and initiatives that produce innovation useful to respond to farmers' and rural stakeholders' problems.

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Appendix

i) matrix tool to collect BBTs with some Italian OGs' BBT already gathered as an example

1 OG / Project attributes

			OG / Project attributes				
Field/variable	**No. Id**	**Code**	**MS OG/PROJECT**	**Region OG/PROJECT**	**Name OG/PROJECT**	**Acronym OG/PROJECT**	**OG/PROJECT Accessible at..**
Specification	Id counter	Formula	dropdown	Code	text	text	(URL,etc.)
	ITA01	tbd	ITA	Piemonte	Progetto BioEconomia Salute e Territorio, economia circolare per la filiera legno-energia	ProBEST	https://www.goprobest.it/
	ITA02	tbd	ITA	Piemonte	Progetto BioEconomia Salute e Territorio, economia circolare per la filiera legno-energia	ProBEST	https://www.goprobest.it/
	ITA03	tbd	ITA	Liguria	Processi di gestione di biomasse e di legname da opera finalizzati alla realizzazione di un centro integrato di trasformazione del prodotto legnoso	LEGNOa360°	http://www.legnoa360.it
	ITA04	tbd	ITA	Liguria	Valorizzazione di materie seconde derivanti da processi di pirolisi di biomasse forestali in contesto di filiera locale	LIGURCHAR	http://www.ligurchar.it

2 BBT' attributes

BBT attributes																					
n BBT	Name BBT	Reference sector	Needs / Problem statement	Objective	Main source of funding	Period	Duration	Partners	Type of partners										Focus Area (RDP) / OS	Status	Geographic Scope
narrative synthesis	code	dropdown	narrative synthesis	narrative synthesis	dropdown	text	Months	Num.	Farmer	Forester	Advisor	Researche r	NGO (env, climate,...)	Processor or retailer	Training organization	Consumer	Public Authority + LAG	Other	dropdown	dropdown	dropdown
agronomic use of bark and remnants	Management of forestry by-products	Forestry	In the production of forest wood fuels, the presence of bark and twigs must be limited. these can be chipped and delivered, essentially at cost price, to thermoelectric plants: an unprofitable and limited solution in the future.	encouraging the agronomic use of bark and remnants as a by-product and as a component of fertilisers; favouring the use of biodegradable fluids	Piedmont RDP	2020 - 2022	16	11		5	1	1	1	1			2		5c	On going	Local
agronomic use of ashes	Management of agricultural by-products	Forestry	In the production of forest wood fuels, the incombustible elements (ash) must be limited. these can be delivered, essentially at cost price, to thermoelectric plants: an unprofitable and limited solution in the future.	encouraging the agronomic use of ashes, as a by-product and as a component of fertilisers; favouring the use of biodegradable fluids	Piedmont RDP	2020 - 2022	16	11		5	1	1	1	1			2		5c	On going	Local
Integrated forestry centre	INTEGRATED AND COMPREHENSIVE SUSTAINABLE FOREST MANAGEMENT SYSTEM	Forestry	Need to create, in a single site, an all-round wood utilisation centre, capable of valorising wood from the highest quality productions to processing waste, maximising revenues and creating synergies and economies	Need to create, in a single site, an all-round wood utilisation centre, capable of valorising wood from the highest quality productions to processing waste, maximising revenues and creating synergies and economies	Liguria RDP	2021 - 2022	18	7		4		1					2		6a	On going	local
Biochar used as fertilizer		Forestry	low-quality timber produced in Liguria has no no possibility of economic placement	encourage economic use of biochar as fertilizer	Liguria RDP	2021 - 2022	18	9	3	1		1	2					2	5c	Conclused	local

3 BBT' Categorisation

BBT categorisation								
	Categories: Bioeconomy fields (Escobar & Lainbach, 2021)						Feedstock	Outcomes and final product
	Crop residues and perennial plants F1	Designer crops for optimised biomass content F2	Algae biomass F3	Waste or recycled material FC	Microbial assisted processing C1	Biorefineries C2	dropdown	narrative synthesis
Forestry	x						Biomass residues	Agronomic Inputs; certified combustible wood
Forestry	x						Biomass residues	Agronomic Inputs; certified combustible wood
Forestry	X						Biomass residues	NOT CLEAR
Forestry	x					x	Biomass residues	Fertilizer

4 BBT' Implementation

BBT implementation						
TRL	Processing Capacity	Mobility	Value chains	C Sink	Intended user / conditions of access	Complexity of the process
pdown	(T/Day)	(dropdown)	(dropdown)	(dropdown)	narrative synthesis	4-point scale
TRL2	??	Mobility	'3 - High potential	Y	nd	1
TRL3	??	Mobility	'3 - High potential	Y	nd	1
TRL1	??	MOBILITY	'3 - High potential	N	nd	1

5 BBT' expected effects

BBT expected results													
Final user										Sustainability			Added value
ırmer	Forester	Advisor	Researcher	NGO (env, climate,…)	Training organization	Processor or retailer	Consumer	Public Authority + LAG	Other	eco (dropdown)	socio (dropdown)	envi (dropdown)	(drop down)
x	x						x	x		M	L	M	VERY LOW
x	x						x	x		L	L	M	VERY LOW
	x							x		L	L	L	VERY LOW
x	x									M	L	H	

5 BBT' costs

BBT costs					
Equipment maintenance costs	**Investment cost**	**Operational costs**	**Return of investment**		**Coherence with BiBionet**
'year)	(€)	(€)	(€)	(YEAR)	traffic light
	83.000				
					traffic light

(ii) questionnaire and informed consent form

Questionnaire

For the BBioNets inventory of BBTs

1 BBioNets in a nutshell

BBioNets is a 3-year Coordination and Support Action running from November 2023 to October 2026, funded by the European Union under the Horizon Europe Framework Programme for Research and Innovation. In response to the increasing need for grassroots initiatives and knowledge sharing to address major challenges such as climate resilience and increased mitigation of GHG emissions, while supporting zero waste and circular economy with biomass reuse. BBioNets constitutes a **thematic network** that will rely on, promote, and further advance the work carried out by EIP AGRI Operational Groups (OGs) with respect to **management and/or processing of agricultural and forest biomass with Bio-Based Technologies (BBTs)**, being **BBTs those technologies or practices that use either non-food feedstock or circularity principles -or both- for delivering diverse products**[3]. Applying the quintuple helix model and a multi-actor approach both within the consortium itself and on the ground activities, BBioNets will set up 6 **regional Forest and Agriculture Networks - FANs** (IE, ES, IT, GR, PL, CZ) that will ensure balanced representation of all kinds of stakeholders.

2 Purpose of this questionnaire

To screen regional bioeconomy dynamics, analyse the cost-effectiveness of BBFs, and unravel BBTs for farmers and foresters, we would like to hear your opinion. The information we collect from this questionnaire will aid us in recommending the best BBTs for farmers and foresters.

Name of the BBT (objective of the interview):

Date:

Interviewer:

Total Estimated duration: 40’ – 45’

2.1 Questionnaire

The use of the below questions below will depend on the information already gathered online, i.e., not all questions may need to be answered

2.1.1 What is the objective of the BBT? And what needs does the BBT fulfil?

2.1.2 From 1 (low) to 4 (high), how complex is the process that the BBT follows?

2.1.3 What is the processing capacity of the BBT in tonnes per day (T/day)?

[3] https://doi.org/10.1016/j.rser.2020.110213

2.1.4 What are the expected significant benefits that the BBT will bring for these 3 types of sustainability if it were to be implemented?

- Economical sustainability
- Sociological sustainability
- Environmental sustainability

2.1.5 What is the added value of the BBT?

- Energy & Heat = Very low
- Bulk Chemicals & Fuels = Low
- Bioplastics & Polymers = Intermediate
- Food/Feed = High
- Fine chemicals = Very high
-

2.1.6 How much is the equipment maintenance costs (€/year)?

(request range of costs, e.g., from €1,000-€5,000)

2.1.7 How much was investment cost (M€)?

- ≤1 M€ = very low
- 1 – 5 M€ = low
- 5 – 9 M€ = intermediate
- 9 – 50 M€ = high
- 50 M€ = very high

2.1.8 How much are the operational costs (€)?

(request range of costs, e.g., from €1,000-€5,000)

2.1.9 How much is the return of investment (€) and in how many years could it be achieved?

(request range of numbers, e.g., from €1,000-€5,000)

INFORMED CONSENT FORM

For the BBioNets inventory of BBTs

1 BBioNets in a nutshell

BBioNets is a 3-year Coordination and Support Action running from November 2023 to October 2026, funded by the European Union under the Horizon Europe Framework Programme for Research and Innovation. In response to the increasing need for grassroots initiatives and knowledge sharing to address major challenges such as climate resilience and increased mitigation of GHG emissions, while supporting zero waste and circular economy with biomass reuse, BBioNets constitutes a **thematic network** that will rely on, promote, and further advance the work carried out by EIP AGRI Operational Groups (OGs) with respect to **management and/or processing of agricultural and forest biomass with Bio-Based Technologies (BBTs)**, being **BBTs those technologies or practices that use either non-food feedstock or circularity principles -or both- for delivering diverse products**[4]. Applying the quintuple helix model and a multi-actor approach both within the consortium itself and on the ground activities, BBioNets will set up six **regional Forest and Agriculture Networks - FANs** (IE, ES, IT, GR, PL, CZ) that will ensure balanced representation of all kinds of stakeholders.

Who we are:

We are < Insert Partner Name > and we are contacting you in the framework of BBioNets a project funded by the European Union under the Horizon Europe Framework Programme for Research and Innovation. A detailed description of how BBioNets handles personal data is presented in the project's Privacy Policy available through the project's web page (https://bbionets.eu/).

Project: BBioNets – BBioNets "Creation and promotion of Forest and Agriculture Networks to boost Bio-Based Technologies adoption and Value Chain development" (Contract Number 101133904).

Partner:

Organisation name: < Insert Partner Name >

Address: < Insert Partner Address >.

Phone: < Insert Partner Phone >.

E-mail: <Insert Partner Generic E-mail Address >

[4] https://doi.org/10.1016/j.rser.2020.110213

Responsible persons:

#	Role	Name	E-mail
1	BBioNets Project Manager	Carmen Girón Domínguez	Carmen.dominguez@mtu.ie
2	<Partner manager >	<Insert name of interviewer from your organisation >	<Insert e-mail of interviewer from your organisation >
3	Data Protection Officer	<Insert name of DPO from your organisation >	<Insert e-mail of DPO from your organisation >

What do we need from you?

We need you to participate in an interview that will be carried out by BBioNets to identify and analyse farmers'/foresters' and rural communities' needs, barriers and challenges to uptake and/or scale up small-scale bio-based solutions as well as to capture awareness levels and perceptions regarding the bioeconomy and bio-based solutions, products and nutrient circularity practices. To do so, we will be asking you to provide cost-related information about the BBT you developed, or help created.

The interview is expected to last for no more than 45 minutes. We will take written notes and we will make a sound recording of the interview.

To effectively conduct this interview, we need to process some of your personal data:

- Your expertise/opinions on the subject matter.

Why do we need your data & what will we do with it?

We need your data to contact you to plan and carry out the interview and to resolve any ambiguities, questions and other issues that may arise after and as a result of the interview. We also need to record your data to keep track of the interview process. The project deliverables, that will feature among others the interview results, will not include your personal data or any other information that could identify you. Your personal data will remain on our written notes (interview transcript) and the sound recording we will make during the interview. This information will be considered sensitive data, stored in the < Insert Partner Name > internal repository, under an anonymous name and not shared outside said stored location.

We will only share your expertise/opinions in an aggregated with the BBioNets project partners that are also involved in this task and will participate in the drafting of the relevant deliverables. We are also obliged to grant access to your data to:

- EU officials such as our Project Officer for purposes related to project evaluation.
- EU agencies and other authorities for project auditing purposes.

We would also be very delighted if you gave us your consent to contact you in the future to ask you to participate in other project activities (e.g., surveys, interviews, project events etc.) and to inform you about the project progress (e.g., by sending you a newsletter or similar messages).

How can you withdraw your consent?

You can withdraw your consent at any time by contacting the responsible individuals listed on the previous page via phone or email. Regarding the informational messages and newsletters you can always opt out by simply clicking the link ''Unsubscribe'' or should specify something similar formulation included at the end of all the relevant messages.

I hereby give my consent to the processing of my personal data needed for:

*(Please, tick the boxes below to confirm that you give us your consent for the respective subject. Any boxes left unticked mean that **you do not consent to the relevant subject**.)*

#	Consent Subject	Tick box
1	My participation in an interview that will be carried out by BBioNets to find cost-related information about the BBT	
2	My participation in future activities of BBioNets	
3	Receiving newsletters and messages regarding BBioNets activities	

_____	_____	_____
Name of participant	Date	Signature

BBioNets

www.bbionets.eu

Document information

Title	BBioNets - Creation and promotion of Forest and Agriculture Networks to boost Bio-Based Technologies adoption and Value Chain development (GA No 101133904)
Start - end date	1/11/2023 – 31/10/2026 (36 months)
Project type	Coordination and Support Action
Programme	Horizon Europe – Cluster 6
Funding	1,998,636.20 €
Coordinator	Munster Technological University Ms. Carmen Girón Domínguez (carmen.dominguez@mtu.ie)
Project overview	**BBioNets** will constitute a thematic network that will rely on, promote, and further advance the work carried out by EIP AGRI Operational Groups (OGs) with respect to **management and/or processing of agricultural and forest biomass with Bio-Based Technologies (BBTs).** The project will set up 6 regional Forest and Agriculture Networks - FANs (IE, ES, IT, GR, PL, CZ) that will identify local needs, prioritise specific BBTs and share BBT knowledge ready for practice to farmers and foresters, boosting the (re)definition of value chains, stimulating cross-fertilisation beyond borders, and bringing Europe to the forefront of farming, forestry, and bioeconomy with economically viable and sustainable practices.
Consortium	MTU Ollscoil Teicneolaíochta na Mumhan Munster Technological University cagasc IUNG Institute of Soil Science and Plant Cultivation State Research Institute TEPRO Consultores Agrícolas, S.L. CTA crea American Farm School Thessaloniki - Greece FOCUS BIO EAST HUB

info@bbionet

@bbionets @bbionets @bbionets @bbionets @BBioNets