



# MAINSTREAM BIO

MAINSTREAMING SMALL-SCALE BIO-BASED  
SOLUTIONS ACROSS RURAL EUROPE

## D2.7

### MainstreamBIO digital toolkit – final version

DRAXIS

29/8/2025



Funded by  
the European Union

## PROJECT INFORMATION

<b>PROGRAMME</b>	Horizon Europe
<b>TOPIC</b>	HORIZON-CL6-2021-CIRCBIO-01-08
<b>TYPE OF ACTION</b>	HORIZON Coordination and Support Actions
<b>PROJECT NUMBER</b>	101059420
<b>START DAY</b>	1 September 2022
<b>DURATION</b>	36 months

## DOCUMENT INFORMATION

<b>TITLE</b>	MainstreamBIO digital toolkit – final version
<b>WORK PACKAGE</b>	WP2
<b>TASK</b>	2.5
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<b>DATE</b>	29 August 2025

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## DOCUMENT HISTORY

Version	Date	Changes	Responsible partner
v0.1	21/7/2025	Initial version	DRAXIS
v0.2	19/8/2025	1st peer review	WR; IUNG
v0.3	25/8/2025	2nd peer review	All partners
v1	29/8/2025	Final version	DRAXIS

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ABBREVIATIONS

CSA	Coordination and Support Action
DSS	Decision Support System
EU	European Union
GDPR	General Data Protection Regulation
MIPs	Multi-Actor Innovation Platform
UI	User Interface
UX	User Experience
WR	Wageningen Research



## Executive summary

MainstreamBIO is a HORIZON Coordination and Support Action (CSA) project funded by the European Union under grant agreement No. 101059420. The project began in September 2022 and runs for a duration of 36 months, concluding in August 2025. Its overarching aim is to co-develop innovation support services and digital tools that build awareness, understanding, and capacity for the uptake of small-scale bio-based solutions, aligned with regional contexts and market needs.

This report presents the outcomes of activities related to the development of the MainstreamBIO digital toolkit, carried out under Work Package 2. The current deliverable, D2.7 – MainstreamBIO Digital Toolkit – final version, summarizes the final version of the toolkit as developed and coordinated by DRAXIS. The toolkit is available to the public at: <https://mainstreambio-digital-toolkit.eu/>.

The toolkit has been envisioned as a comprehensive, user-friendly online platform that serves individuals interested in bioeconomy, whether they are newcomers seeking to learn or experienced professionals looking to expand their knowledge and impact. It provides a dynamic digital environment that integrates education, decision support, collaboration, and access to resources that can help users implement real-world bio-based solutions.

Designed to support the adoption of small-scale bio-based innovations across rural Europe, the digital toolkit comprises nine (9) core components:

- A Catalogue of small-scale bio-based technologies, business models, and social innovations, allowing for cross-case comparison and opportunity assessment.
- A Collection of Best Practices for improved nutrient recycling and sustainable organic matter management.
- A curated set of MainstreamBIO Resources, including audiovisual educational materials and profiles of the bioeconomy landscape in seven EU rural regions.
- A Decision Support System (DSS) to help match available biomass and waste streams with relevant technologies, business models, and social innovations.
- The BioForum, a communication space for exchanging ideas, solutions, and good practices with other members of Multi-Actor Innovation Platforms (MIPs).
- A Bioeconomy Repository that aggregates educational content from related bioeconomy projects to raise awareness and promote knowledge sharing.
- A Tool Library, providing access to bioeconomy tools from other EU-funded projects (e.g. knowledge hubs, online encyclopedias, digital tools, and similar platforms)
- A comprehensive Instructions section with video and text-based guidance to support optimal use of the platform.
- A Webinars section featuring audiovisual learning content and further insights into the bioeconomy profiles of the seven focus regions.

This document also details the fully functional pages of the digital toolkit, alongside the initial wireframes and mockups that guided their development. It explains the purpose and intended functionality of each page and outlines the objectives they aim to support. The development process followed an iterative design methodology: beginning with wireframes, progressing to mockups, and integrating feedback and visual design elements to enhance usability, interactivity, and user experience.

### Main Changes between D2.5 and D2.7

Section / Component	D2.5 (Initial Version – Feb 2024)	D2.7 (Final Version – Aug 2025)	Major Change
<b>Improved UI/UX</b>	First version of the Toolkit	Visual overhaul with UI/UX with refined visuals, accessibility features, and optimized navigation	Improved UI/UX, better usability and accessibility.
<b>Toolkit Components</b>	8 main components (Catalogue, Nutrient Practices, Resources, DSS, Bioeconomy Repository, Tool Library, BioForum, Instructions).	Expanded to 9 core components (added Webinars)	+1 functionalities (Webinars, renamed and expanded Other MainstreamBIO Resources)
<b>Homepage Structure</b>	4 pillars: Sustainable Solutions, Information Platforms, Innovation Resources, Learning Center. Includes a welcome pop-up.	Navigation reorganized into 4 headers: Catalogue & Resources, Decision Support & BioForum, Repository & Tool Library, Instructions & Webinars. No pop-up.	Removed pop-up; renamed/restructured headers and streamlined homepage.
<b>Decision Support System</b>	3-step process: Matching Table → Scoring Table → Radar Chart.	Expanded 6-step DSS: Matching Table → Social Impact → Economic Impact → Environmental Impact → Implementation Requirements → Radar Chart. Added popups with info/arguments, updated PDF export.	Extended DSS from 3 to 6 steps, more detailed impact assessment.
<b>Resources</b>	Included audiovisual materials and 7	Structured subsections for audiovisuals and	More audio-visual material and better



	regional bioeconomy profiles.	bioeconomy profiles; detailed country profiles (e.g. Netherlands).	navigation between the countries.
<b>BioForum</b>	Basic forum: users can post, comment, share PDFs/images, logged-in required.	Enhanced: structured communities (6 groups), thematic tags, advanced rich-text editor, search/filtering.	Expanded functionality and usability.
<b>Repository</b>	Audiovisual + documents, filterable. Content volume unspecified.	Audiovisual (15 videos) + documents (561 items) with advanced filters.	Content significantly expanded & quantified.
<b>Tool Library</b>	Collection of external bioeconomy tools.	Same function, but broader selection of planning/monitoring tools.	Expanded content.
<b>Instructions / Learning</b>	Instructions page only.	Instructions (with transcript + video) + Webinars section (10 webinars).	Addition of Webinars, updated and improved instructions.
<b>Account Section</b>	Basic account functions: profile, email/username, delete, password, privacy policy.	Expanded: added Rate Us feature, feedback questions, profile picture upload, privacy tabs.	Enhanced account features.
<b>Annexes</b>	Included user requirements questionnaire and wireframes/mockups.	No annexes; streamlined final version.	Removed annexes, focused on final content.
<b>Action Plan</b>	Up to delivery of first version (M18).	Extended through final delivery (M36), including translation, testing, and updates.	Extended timeline to full project lifecycle.

# 1. Introduction

One of the key objectives of MainstreamBIO was to develop and implement a digital toolkit that effectively connects bio-based technologies, social innovations, and sustainable nutrient recycling practices with existing biomass resources and market trends. In addition, the toolkit aims to strengthen understanding of the bioeconomy by providing educational resources built on existing research findings and available tools.

## 1.1 Description of Task 2.5 in Grant Agreement

The development and maintenance of MainstreamBIO digital toolkit is included in *Task 2.5: Development, upgrade and integration of digital tools in the MainstreamBIO digital toolkit* led by DRAXIS and supported by the entire consortium of the project.

The description of the task as described in the Grant Agreement is:

“DRAXIS will develop and maintain the MainstreamBIO digital toolkit during the project. WR will be responsible for providing the necessary material for the implementation of the decision support system developed under Task 2.4 with support from INNV (for available business models), IUNG (for nutrients recycling practices), WHITE (for social innovations) and MTU (for education and awareness raising practices). Q-PLAN will be responsible for collecting the material for the Bioeconomy Repository and Tool Library, using as a starting point the respective TRANSITION2BIO awareness, communication and education toolkits. The digital toolkit (D2.4) will be fine-tuned based on data collected from its practical use across each of the project’s two innovation support rounds.”

The MainstreamBIO digital toolkit played a pivotal role in the project's overall progress and represented a key milestone. To ensure its timely and efficient development, DRAXIS worked in close collaboration with all partners, developed a clear plan and timeline to guide its delivery.

## 1.2 Approach and methodology

As outlined in detail in Deliverable D2.5, our development journey followed a structured three-step methodology, beginning with an analysis phase built on insights gathered through a 50-question user survey. This helped us define user needs and informed every stage of the process.

We kicked off the design work by creating mockups in Whimsical, which allowed us to map out early concepts and structure the user flow. These drafts were reviewed extensively, incorporating feedback based on user stories and supporting resources such as visual catalogues and feature references.

To move from wireframes to a more polished and interactive design, we transitioned to Figma, a widely adopted tool in the design community. Figma enabled us to visualize the look and feel of the toolkit, including its layout, content structure, and user navigation across different pages and functionalities.

Once the visual design was complete, we used Figma’s import feature to bring the layouts into Bubble.io, marking the start of development. Bubble.io, a powerful no-code platform, was chosen for its speed, flexibility, and scalability. It allowed us to turn designs into a working application quickly

while maintaining control over both functionality and aesthetics, ensuring that the toolkit is user-friendly, adaptable, and ready for real-world use.

## 1.3 Action Plan

The action plan in [Table 1](#) was initially presented during the kick-off meeting in Thessaloniki and subsequently updated at each project meeting: the 2<sup>nd</sup> in Cork, the 3<sup>rd</sup> in Almere, the 4<sup>th</sup> in Viborg, the 5<sup>th</sup> in Madrid, the 6<sup>th</sup> held online, and the final update during the 7<sup>th</sup> project meeting in Brussels.

*Table 1: Action plan for Task 2.5 was presented at kick-off meeting and updated at each project meeting.*

No.	Action point	Who	By When	Month
1	Align with sister projects on synergies and avoiding overlaps regarding the toolkits	DRAXIS, WR, Q-PLAN	15/4/23	M8
2	Receive catalogue of small-scale bio-based technologies, business models and social innovations	WR, WHITE, INVV	30/4/23	M8
3	Receive catalogue of the collected nutrient recycling practices	IUNG	30/4/23	M8
4	Online meetings with material providers for the design and functionality of the toolkit	DRAXIS, WR, INVV, WHITE, MTU, Q-PLAN, IUNG	20/6/23	M10
5	Receive material for Bioeconomy Repository	Q-PLAN	30/6/23	M10
6	Results from the questionnaire for user requirements	DRAXIS	30/6/23	M10
7	Discuss implementation of multi-criteria decision model in Toolkit	WR, INN	30/6/23	M10
8	Receive results for the MainstreamBIO digital toolkit functionality from the participants in the co – creation workshops	INVV	15/7/23	M11
9	Delivery of 1 <sup>st</sup> design multi-criteria decision model	WR, INN	20/7/23	M11
10	Receive outcomes from WP1, which will be included in the toolkit	MTU, WHITE	31/7/23	M11
11	Creation of 1 <sup>st</sup> MainstreamBIO digital toolkit's functional design	DRAXIS	31/7/23	M11
12	MainstreamBIO digital toolkit's development – 1 <sup>st</sup> prototype	DRAXIS	30/11/23	M15

13	1 <sup>st</sup> innovation support round	All partners	31/12/23	M16
14	Delivery of toolkit's 1 <sup>st</sup> version	DRAXIS	29/2/24	M18
15	Feedback analysis from Capacity Building Workshops	DRAXIS	30/6/24	M22
16	Finalization of Nutrient Recycling Practices	DRAXIS	31/7/24	M23
17	Finalization of Content (Descriptions, Features)	DRAXIS, WR	31/8/24	M24
19	Finalization of BioForum	DRAXIS	31/10/24	M26
20	Update of Toolkit's Decision Support System	WR, DRAXIS	30/11/24	M27
21	Integration of feedback from partners	All partners, DRAXIS	31/12/24	M28
22	Finalization of Translation in all EU languages	DRAXIS	31/12/24	M28
23	Quality testing of the Toolkit	All partners	28/2/25	M30
24	Updating the User Interface/User Experience	DRAXIS	30/4/25	M32
25	Finalization of Decision Support System	WR, DRAXIS	30/6/25	M34
26	Finalization of Instructions	All partners, DRAXIS	29/8/25	M36
27	Delivery of digital toolkit final version (Deliverable 2.7)	DRAXIS	29/8/25	M36

## 1.4 Content of deliverable

This deliverable provides an overview of how the MainstreamBIO digital toolkit was created, from gathering requirements and developing the platform to producing content, launching it, and rolling out updates. The toolkit is available to the public at: <https://mainstreambio-digital-toolkit.eu/>

## 2. MainstreamBIO digital toolkit

### 2.1 Home Page

Upon landing on the [homepage](#), visitors are welcomed with an animation featuring the MainstreamBIO logo and with its core message. The header section provides key navigation options, including language selection using [Google Translate](#) and direct access to the toolkit's four main thematic categories of pages: Catalogue & Resources, Decision Support & BioForum, Repository & Tool Library, and Instructions & Webinars. These categories serve as structured entry points to the toolkit's nine (9) core functionalities. A login and signup feature are also available, enabling users to create customized Decision Support Systems (DSS) or actively engage in discussions via the BioForum.

Further down the page, a prominent "Find Out More" button is located, allowing users to scroll or click to access detailed descriptions of each available functionality. In addition, an accessibility support widget from [UserWay](#) is positioned at the bottom right corner of the interface. This feature enhances inclusivity by offering customizable options to accommodate a diverse range of user needs.

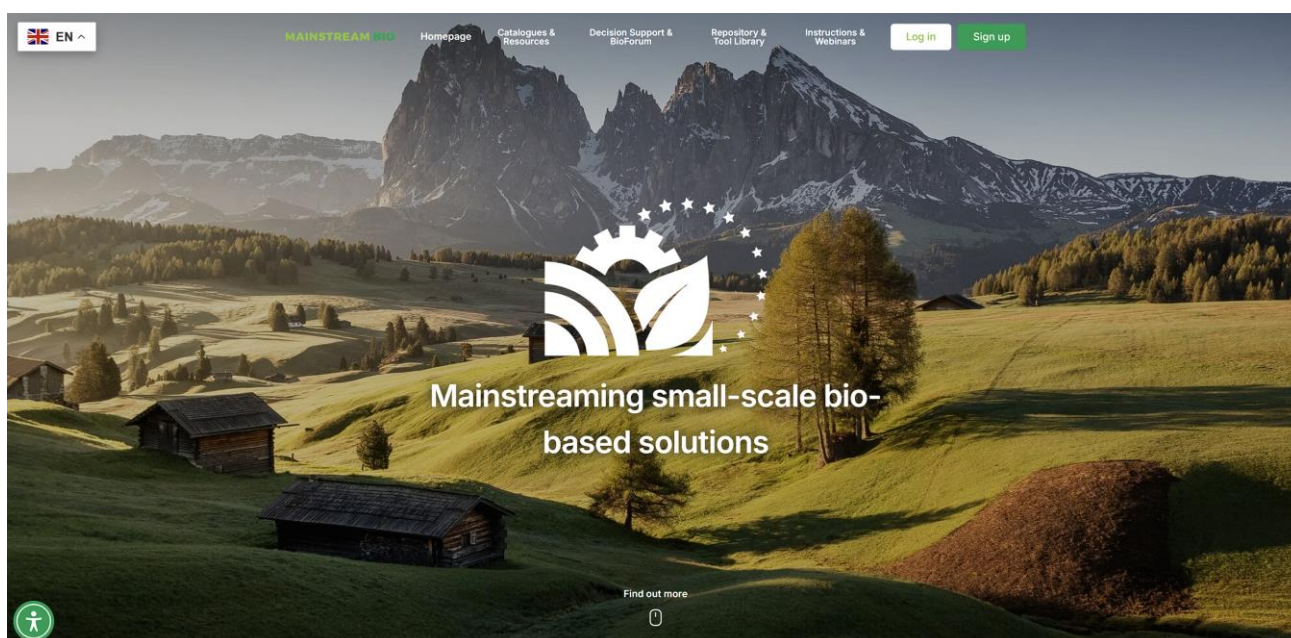


Figure 1: Homepage

### 2.2 Header (Catalogue & Resources)

The Catalogue & Resources section of the toolkit comprises three core functionalities: the Catalogue of Small-Scale Bio-Based Solutions, Nutrient Recycling Best Practices, and Other MainstreamBIO Resources. Each functionality is supported by a concise description that outlines its purpose, scope, and relevance within the broader context of the toolkit. This section aims to provide users with structured access to practical knowledge, case studies, and reference materials that support the uptake and replication of bio-based solutions across regions.

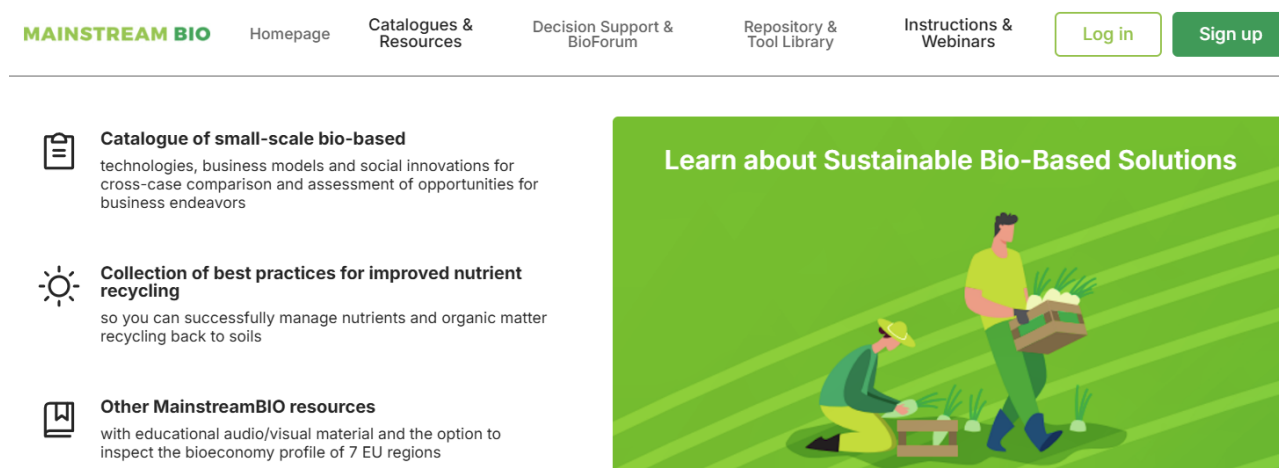


Figure 2: Catalogues &amp; Resources (Header)

## 2.3 Header (Decision Support & BioForum)

The Decision Support & BioForum section contains two key functionalities of the toolkit: the Decision Support System (DSS) and the BioForum. These components are designed to support evidence-based decision-making and foster collaborative dialogue among stakeholders in the bioeconomy sector. The DSS enables users to develop tailored support systems based on specific parameters and regional contexts, while the BioForum facilitates knowledge exchange, peer-to-peer interaction, and community building around bio-based initiatives.

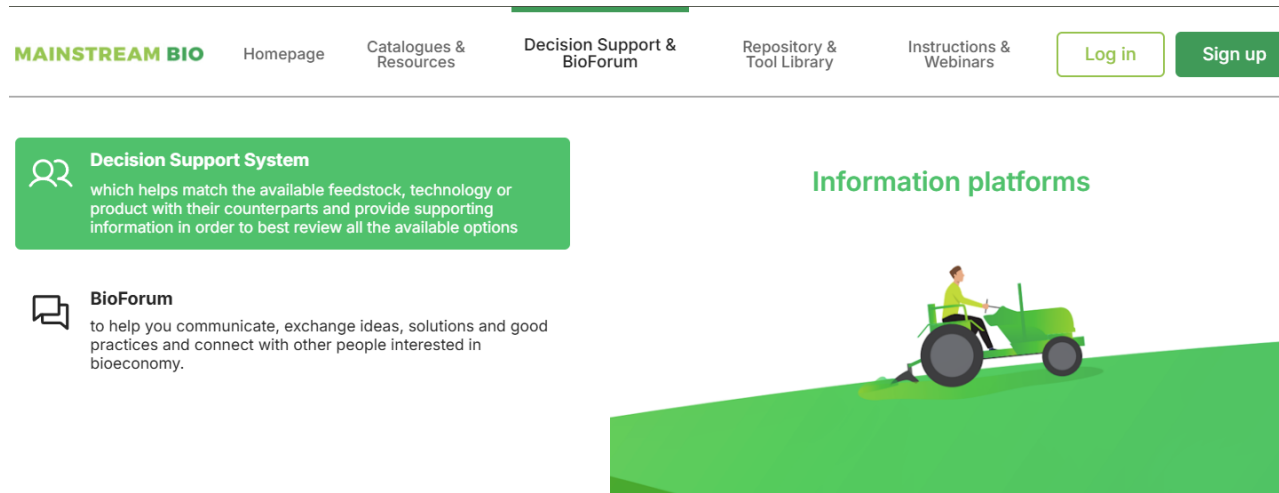


Figure 3: Decision Support &amp; BioForum (Header)

## 2.4 Header (Repository & Tool Library)

The Repository & Tool Library section includes two distinct functionalities: the Bioeconomy Repository and the Tool Library. This section offers users access to a curated collection of key documents, methodologies, instruments, and digital tools that support innovation and informed decision-making in the bioeconomy sector. The content is intended to serve as a practical reference for stakeholders seeking to adopt, adapt, or scale up bio-based practices and solutions across various regional and thematic contexts.





Figure 4: Repository &amp; Tool Library (Header)

## 2.5 Header (Instructions & Webinars)

The Instructions & Webinars section serves as a central hub for user support and instructional content. It includes the Instructions page, which offers step-by-step guidance on how to navigate and utilize the toolkit's functionalities. This guidance is provided through an integrated audio-visual tutorial accompanied by a full transcript to ensure accessibility for all users.

In addition, the section features a dedicated Webinars page, which hosts all webinar content produced within the framework of the MainstreamBIO project. This includes recordings of live training sessions delivered by project partners and external experts. Collectively, these resources aim to facilitate user engagement, promote knowledge transfer, and support the effective adoption of the toolkit across diverse stakeholder groups.

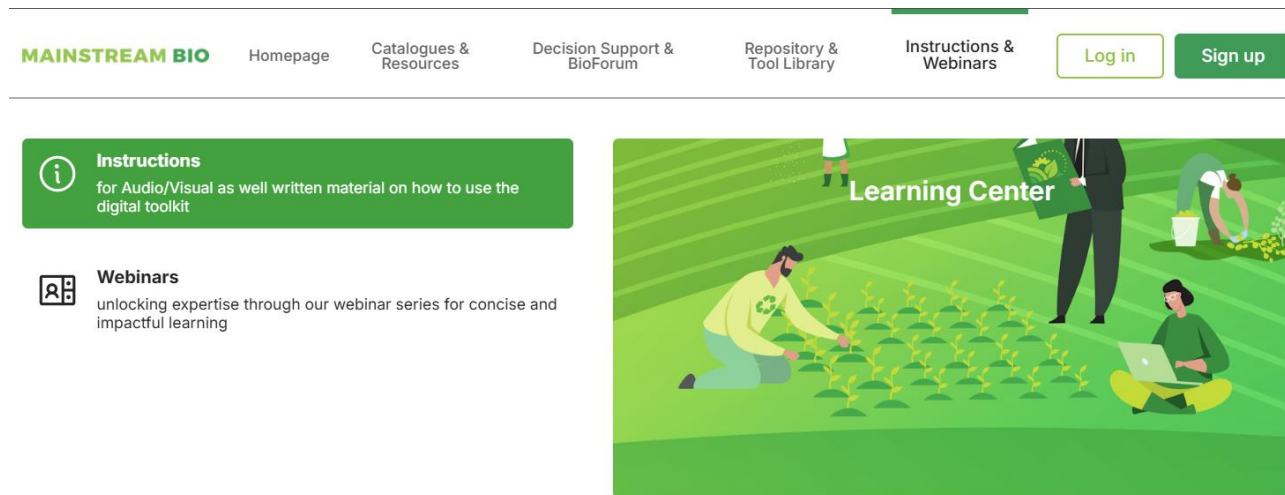
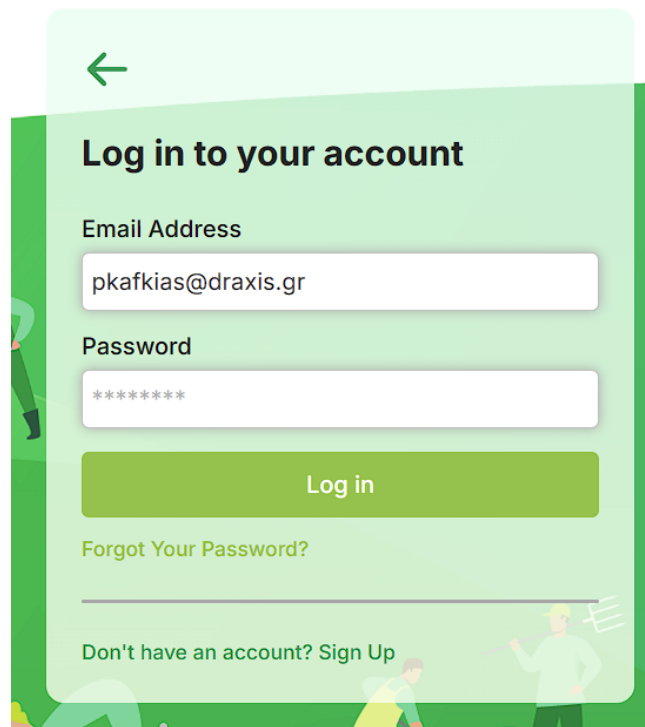


Figure 5: Instructions &amp; Webinars (Header)

## 2.6 MainstreamBIO Login/Signup Page

Users can access the toolkit by logging in with their registered email address and password. In cases where login credentials are forgotten, a password recovery option is available through the "Forgot your password?" functionality. New users can create an account by completing a straightforward registration process, which requires the submission of a username, email address, password, and password confirmation.



The image shows a mobile app interface for logging in. At the top left is a green back arrow. The title 'Log in to your account' is in bold black text. Below it are two input fields: 'Email Address' with the value 'pkafkias@draxis.gr' and 'Password' with masked characters '\*\*\*\*\*'. A green 'Log in' button is below the password field. Underneath is a link 'Forgot Your Password?'. At the bottom is a link 'Don't have an account? Sign Up'. The background features a green field with stylized figures of people working.

←

## Log in to your account

Email Address

pkafkias@draxis.gr

Password

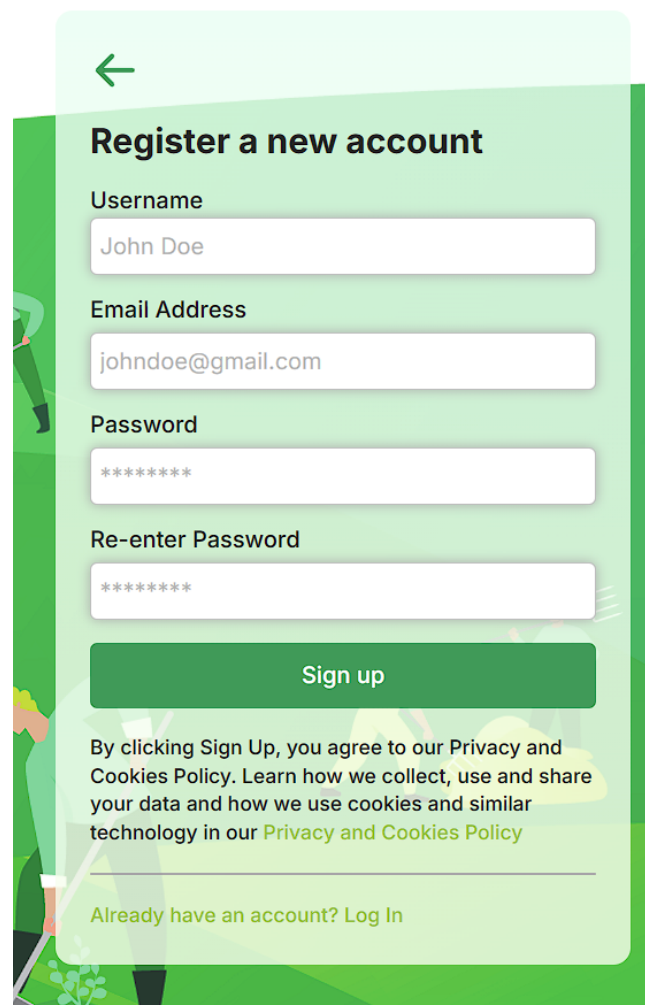
\*\*\*\*\*

Log in

[Forgot Your Password?](#)

[Don't have an account? Sign Up](#)

Figure 6: MainstreamBIO Log in Page



The image shows a mobile app interface for registering a new account. At the top left is a green back arrow. The title 'Register a new account' is in bold black text. Below it are four input fields: 'Username' with the value 'John Doe', 'Email Address' with the value 'johndoe@gmail.com', 'Password' with masked characters '\*\*\*\*\*', and 'Re-enter Password' with masked characters '\*\*\*\*\*'. A green 'Sign up' button is below the second password field. Below the button is a paragraph of text: 'By clicking Sign Up, you agree to our Privacy and Cookies Policy. Learn how we collect, use and share your data and how we use cookies and similar technology in our [Privacy and Cookies Policy](#)'. At the bottom is a link 'Already have an account? Log In'. The background features a green field with stylized figures of people working.

←

## Register a new account

Username

John Doe

Email Address

johndoe@gmail.com

Password

\*\*\*\*\*

Re-enter Password

\*\*\*\*\*

Sign up

By clicking Sign Up, you agree to our Privacy and Cookies Policy. Learn how we collect, use and share your data and how we use cookies and similar technology in our [Privacy and Cookies Policy](#)

[Already have an account? Log In](#)

Figure 7: MainstreamBIO Sign up Page

## 2.7 Home page (Feature Selector)

By clicking the "Find Out More" button or scrolling down on the homepage, users are presented with a concise overview of the toolkit's structure, offering direct access to all nine (9) core functionalities. This section enables users to quickly identify and navigate to the specific functionality that aligns with their interests or needs.

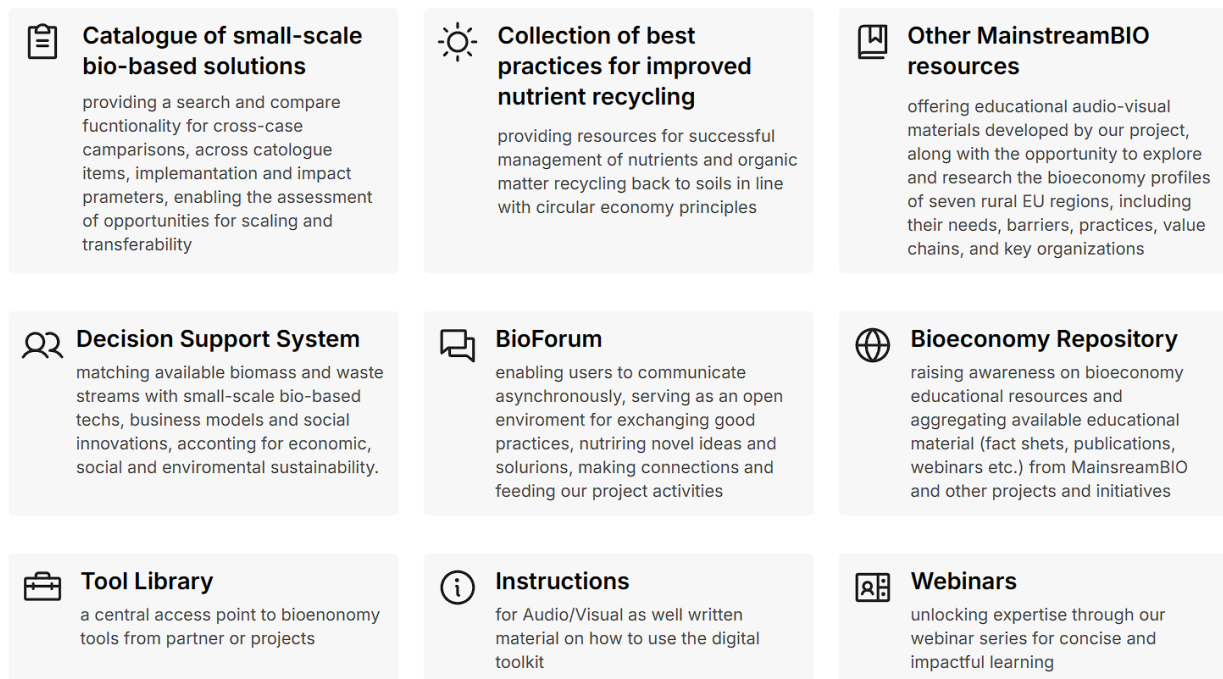


Figure 8: Home Page (Sustainable solutions)

## 2.8 Home page (Partners)

Beneath the feature selection area, the homepage includes a dedicated section displaying interactive partner logos, allowing users to navigate directly to the official webpages of each MainstreamBIO partner organization by clicking on the corresponding logo.

## Our consortium partners



Figure 9: Home Page (Partners)

## 2.9 Footer

The footer of the digital toolkit includes several key elements designed to ensure transparency, accessibility, and user engagement. The MainstreamBIO project logo is positioned prominently at the left hand side and functions as a hyperlink redirecting users to the official [MainstreamBIO project website](#). Centrally positioned within the footer is the official European Union funding disclaimer, acknowledging the financial support provided for the implementation of the project and including the appropriate legal notice.

On the right hand side of the footer, users can access the project's social media links along with a dedicated feedback section. This feature allows users to submit comments, suggestions, or issue reports, contributing to the ongoing enhancement, expansion, and refinement of the toolkit. Beneath the feedback section, links to the MainstreamBIO Privacy Policy and Toolkit Usage Instructions are provided, offering transparency regarding data protection and user guidance. At the bottom of these elements, a disclaimer regarding the use of the Google Translate plugin is included, informing users that content may be automatically translated and could contain inaccuracies. Finally, at the bottom of the footer, the copyright notice states that the toolkit is developed and hosted by DRAXIS Environmental SA, providing the necessary legal and ownership information.



Figure 10: Footer

## 2.10 Catalogue of small-scale bio-based solutions (Selection Table)

The [Catalogue of small-scale bio-based solutions](#) page functions as a structured repository of bio-based technologies, systematically classified into three main categories: biochemical (7), mechanical and thermomechanical (4) and thermochemical (5) processes. It comprises sixteen (16) distinct small-scale technological solutions, including aerobic digestion, blending or mixing, and combustion, among others. These solutions are presented to support the dissemination of sustainable practices, raise awareness of environmentally responsible approaches, and illustrate technological diversity across the bioeconomy sector.

In parallel, the Catalogue section includes a set of thirty-four (34) business models originating from eighteen (18) countries, offering a broad overview of international market strategies. This collection enables users to gain insights into diverse implementation contexts and innovation pathways within the bioeconomy. To support targeted exploration and improve usability, filtering options are available based on description, country, and/or keyword.

Additionally, eighteen (18) social innovations from fourteen (14) countries are made available within the Catalogue. These examples reflect community-based approaches that integrate environmental and social objectives. Users are able to conduct comparative assessments of the innovations, with filtering capabilities based on description, country, and/or keyword supporting contextual analysis and user-driven exploration.



— Select one of the three categories of bio-based solutions to explore a specific case.

## Catalogue of small-scale bio-based solutions

Technologies 16

Business models 34

Social Innovations 18

Please select one of the following categories

Biochemical 7

Mechanical and Thermomechanical 4

Thermochemical 5

Code	Title	Brief description
B1	Aerobic conversion (composting)	An aerobic conversion process relies on microorganisms that thrive under aerobic conditions i.e. where plenty of oxygen is available and a sufficient amount of feedstock is present.
B2	Anaerobic digestion	Anaerobic digestion is a series of biological process in which micro-organisms break down organic material under oxygen-free conditions.
B2b	Upgrading biogas	During the upgrading process all contaminations are filtered from the biogas and it is dried. Also almost all of the carbon dioxide is selectively extracted.
B3	Fermentation	Fermentation is a process in which micro-organisms (bacteria, yeasts, moulds) are used to convert organic material into alcohol, acids or hydrogen, for instance and carbon dioxide.
B4	Insect-based bioconversion	Insect-based bioconversion also known as insect farming is based on the selection of insect species e.g. Black Soldier Fly (BSF) larvae, house fly maggots, mealworms, and grasshoppers-cricket and different rearing substrates.
B5a	Cultivation Mushrooms	The production system of mushrooms.
B5b	Cultivation Algae	The production system of algae.

Figure 11: Catalogue of small-scale bio-based solutions (Selection Table – Technologies)





— Select one of the three categories of bio-based solutions to explore a specific case.

## Catalogue of small-scale bio-based solutions

Technologies 16

Business models 34

Social Innovations 18

Please decide whether you want to search by code, by typing a description or by country

Search descriptions

Filter by country

Type keyword

Code	Title	Brief description	Country	Keywords
C1.1	Pindos	This Greek company converts poultry manure into organic fertilizers using aerobic conversion.	Greece	Fertilizer, Manure, Poultry, Broiler
C1.2	Pedrin	This Spanish company converts goat and sheep manure into organic fertilizers using aerobic conversion.	Spain	Fertilizer, Manure, Goat, Sheep
C2.1	Biowert	This German company converts grass juice and food residues into biogas through anaerobic digestion. Biogas is converted into electricity.	Germany	Biogas, Grass juice, Food residues, Electricity, Heat, Bioenergy
C2.2	HoSt	This Dutch company uses anaerobic digestion to convert cattle manure into biogas. Three products are derived: biomethane, electricity and nitrogen-rich fertilizer.	The Netherlands	Anaerobic digestion, Manure, Biogas, Biomethane, Small scale, Natural gas, Farm
C2.3	Pilze-Nagy	This Hungarian company uses anaerobic digestion to convert spent mushroom substrate and other agri-food wastes into biogas. Besides electricity, they also obtain solid and liquid fertilizers.	Hungary	Electricity, biogas, Anaerobic digestion, Spent mushroom substrate, Oyster mushroom, Mushroom,

Figure 12: Catalogue of small-scale bio-based solutions (Selection Table – Business models)

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— Select one of the three categories of bio-based solutions to explore a specific case.

## Catalogue of small-scale bio-based solutions

Technologies 16 Business models 34 Social Innovations 18

Please decide whether you want to search by country, by typing a description or by typing a keyword

Search description Filter by country Type keyword

Code	Title	Brief description	Country	Keywords
D1	L'Atelier Paysan	This cooperative aims to empower farmers by promoting technical and technological sovereignty through an open source resource platform for farm production tools, which provides access to online resources, videos, trainings, and knowledge exchange sessions.	France	Awareness raising, Technology utilization, Online resources
D2	Organic Food Valley (EkoLubelszczyzna)	This social innovation project aims to develop a cooperative network between different actors involved in the production, processing, and marketing of organic food and eco-products/services.	Poland	Jobs generation, Access to network
D3	Rural HUB	The Rural HUB connects socially responsible individuals and organizations with traditional farmers through an educational complex and co-working space, offering comprehensive programs for sustainable farm development in rural areas.	Serbia	Financial support, Jobs generation, Education / Training
D4	ARDAC	The reforestation and sustainable forest management	Lebanon	Jobs generation,

Figure 13: Catalogue of small-scale bio-based solutions (Selection Table – Social innovations)

## 2.11 Catalogue of small-scale bio-based solutions (Specific)

Once a user selects a specific technology, a dedicated page will open where they'll find a clear overview of the technology, along with detailed information on suitable feedstock, technical specifications, related products, and helpful references for further reading. All of this content can also be easily downloaded as a PDF using the download button.

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— Biochemical technology

# B1 Aerobic conversion (composting)

## Brief description

An aerobic conversion process relies on microorganisms that thrive under aerobic conditions i.e. where plenty of oxygen is available and a sufficient amount of feedstock is present.

Potential feedstock Technology Products References

## Categories

Secondary biomass: Residues from forestry and forest-based industry; Residues from nature and landscape; Residues from livestock production; Organic residues from restaurants, food shops and households.

## Examples

Suitable raw materials are Source Separated Organics (SSO), pruning and mowing material (grass, verge grass, grass from nature areas, foliage), straw, dry manure types, the thick fraction of digestate from various types of digesters, thickened sludge from biological wastewater treatment and residues of the agro-industry. The material must be damp but solid and porous, which excludes liquids and slurry. To guarantee a high quality compost pieces of glass, metal and plastic should be avoided in the raw material. [2, 5]

← Back to Catalogue Download Technology

Figure 14: Catalogue of small-scaled bio-based solutions (Specific - Technology)

When a user selects a specific business, a dedicated page will open where they'll be able to explore detailed information such as feedstock analysis, technological specifications, impact assessments, and relevant reference materials. All of this content can also be easily downloaded as a PDF using the download button.

**MAINSTREAM BIO****Small scaled bio-based technologies****B1. Aerobic conversion**

An aerobic conversion process relies on microorganisms that thrive under aerobic conditions i.e. where plenty of oxygen is available and a sufficient amount of feedstock is present.

**A. Potential feedstock****Categories**

Secondary biomass: Residues from forestry and forest-based industry; Residues from nature and landscape; Residues from livestock production; Organic residues from restaurants, food shops and households.

**Examples**

Suitable raw materials are Source Separated Organics (SSO), pruning and mowing material (grass, verge grass, grass from nature areas, foliage), straw, dry manure types, the thick fraction of digestate from various types of digesters, thickened sludge from biological wastewater treatment and residues of the agro-industry. The material must be damp but solid and porous, which excludes liquids and slurry. To guarantee a high quality compost pieces of glass, metal and plastic should be avoided in the raw material. [2, 5]

**B. Technology****Technology name**

Aerobic conversion

**TRL**

9

**Description of technology**

An aerobic conversion process relies on microorganisms that thrive under aerobic conditions i.e. where plenty of oxygen is available and a sufficient amount of feedstock is present [1].

An example is composting which is a microbiological process in which heterogeneous organic material is oxidised and broken down into compost, CO<sub>2</sub>, H<sub>2</sub>O and heat in a set-up where air passes through a heap (pile, mound) of porous, solid material. Although composting can occur spontaneously in the field (for example in mown verge grass), the process referred to here is controlled composting. It is often carried out with forced ventilation (through a ventilator) in a container, hall or in the open air. [2]

The aim of composting is to produce a final product that is stable, free of pathogens and germinable weed seeds. The composting process proceeds through three phases: i) mesophilic 10-45°C, ii) thermophilic 45-70°C and iii) maturation (curing). [3]

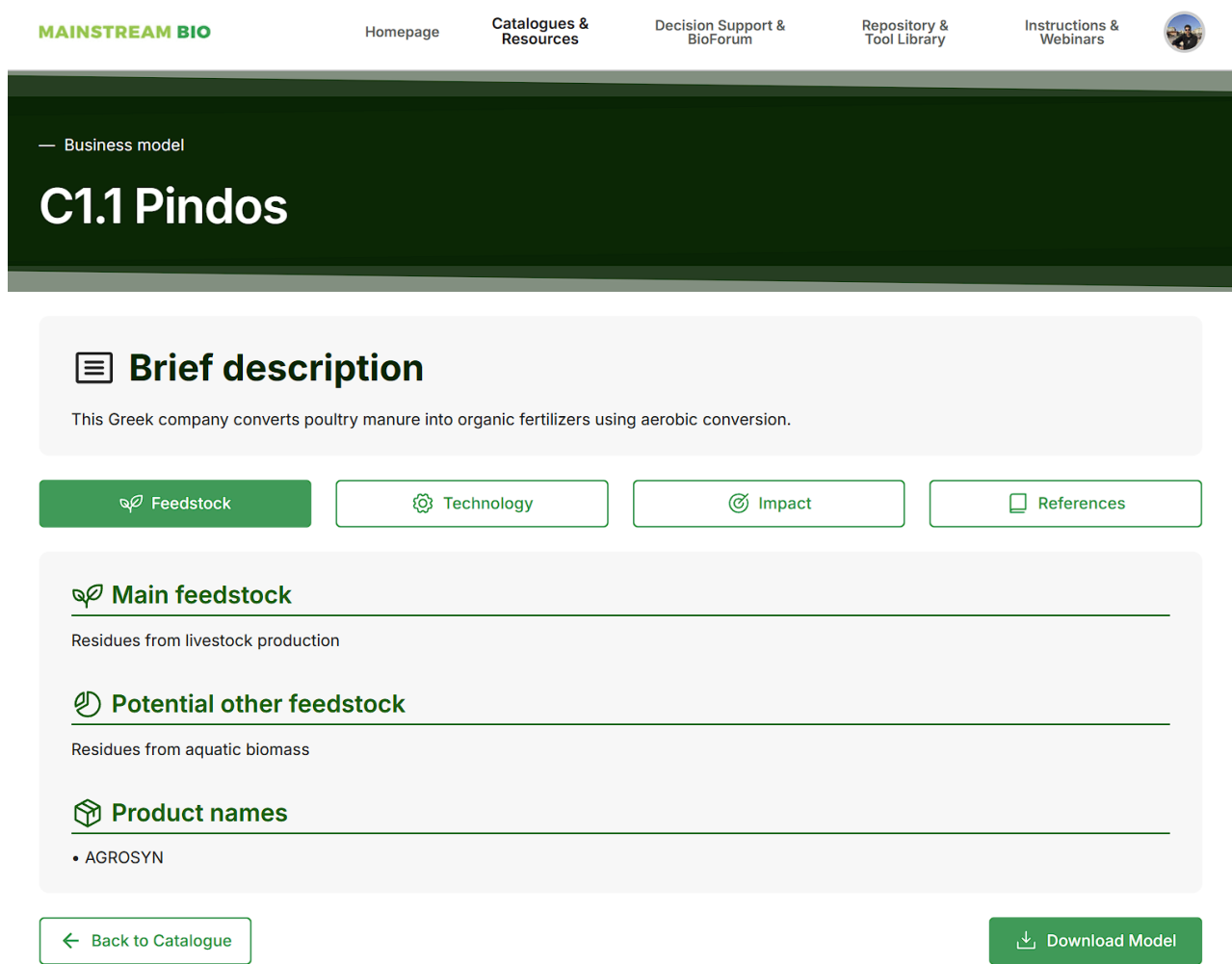


Figure 16: Catalogue of small-scaled bio-based solutions (Specific – Business model)

Finally, users have the opportunity to explore each social innovation in detail — gaining insights into its activities, key stakeholders, contribution to the bioeconomy, and wider social impact. All related information can also be conveniently downloaded in PDF format via the designated download button.

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Social innovation

L'Atelier Paysan

Description

This cooperative of small-scale farmers, employees, and agricultural development organizations is a social innovation dedicated to empowering farmers by disseminating agricultural knowledge and promoting technical and technological sovereignty. Through an open source resource platform for farm production tools, the collective aims to collectively develop tools adapted to the regional agro-ecological practices. This platform provides access to online resources, videos, trainings on construction and autonomy, and knowledge exchange sessions.

Activites

Actors involved

Impact for bioeconomy development

Social impact

Activities

The cooperative supports farmer-led research and development, disseminates open source materials for organic farming, and leads training sessions to create self-sufficient farming systems. The tools developed are adapted to the context in which they are used in concrete terms. The cooperative also encourages farmers to think innovatively and come up with sustainable solutions to the problems they face.

Back to Catalogue

Download Innovation

Figure 17: Catalogue of small-scaled bio-based solutions (Specific – Social innovation)

## 2.12 Nutrient Recycling Practices (Selection Table)

The [Nutrient Recycling Practices](#) page presents a carefully curated selection of thirty-one (31) agricultural practices, each strategically designed to promote sustainable agricultural and environmental methodologies. This comprehensive collection consolidates proven strategies, providing valuable insights into optimizing nutrient management, minimizing waste, and enhancing resource efficiency. It is specifically tailored to meet the needs of farmers, environmentalists, and policymakers, offering a detailed roadmap for the adoption of practices that not only increase crop yields but also reduce environmental impacts. By emphasizing innovation and leveraging successful implementations, this compilation serves as a knowledge repository, facilitating the dissemination of effective strategies to address global challenges in nutrient cycling within agriculture. The page's ultimate goal is to contribute to the development of a more resilient and environmentally sustainable food production system. Users can filter practices by title or by entering keywords from the practice descriptions, enabling easy access to relevant content.





— You can further select by clicking on of the practices below.

## Nutrient Recycling Practices

Select by title

Type description keyword

31 items

Code	Title	Brief description
P1	Algae cultivation	Algae cultivation on manure and digestate offers a sustainable way to utilize excess resources, capture CO <sub>2</sub> , and produce high-protein biomass. While it's ideal for on-farm applications, the high cost and legal restrictions in the Netherlands currently limit its feasibility for direct livestock feed.
P2	Ammonia stripping & Scrubbing	Ammonia stripping and scrubbing is a treatment method to reduce NH <sub>3</sub> emissions for regulatory compliance. It involves altering pH and temperature to shift the equilibrium of NH <sub>3</sub> to NH <sub>4</sub> <sup>+</sup> and then separating the NH <sub>3</sub> gas, which is subsequently dissolved in an acidic liquid to produce N minerals like ammonium sulfate or ammonium nitrate. Commercial technologies are available for this process.
P3	Anaerobic digestion (WUT)	The Green Generation Anaerobic Digestion plant processes 23,000 tons of food waste and pig slurry annually to produce biogas and organic fertilizer rich in nutrients (nitrogen, phosphorus, and potassium). Local farmers use it, some even replacing chemical fertilizers, but due to high water content, it's spread with traditional equipment, with discussions about drying or pelletizing, although current returns don't justify the investment.
P4	Anaerobic digestion (WR)	Anaerobic digestion is a fermentation process that converts organic matter like manure and crop residues into biogas (CH <sub>4</sub> ). This biogas can be upgraded for the gas network or used for heat, offering benefits to farmers due to biogas production and nutrient-rich digestate suitable for precise field application.
P5	Appropriate manure application	Animal manure contains valuable crop nutrients like N, P, and K, but applying it solely to meet one nutrient's needs may lead to over or under application of others, necessitating commercial

Figure 18: Nutrient Recycling Practices (Selection Table)

## 2.13 Nutrient Recycling Practices (Specific)

By selecting a specific nutrient recycling practice, users are presented with a comprehensive overview that includes its description, objectives, contextual relevance, key components, and processes. They can also explore details on implementation, relevant legislation, and a curated list of references for further reading and verification. All information is available for download in PDF format via the provided download button.



— Nutrient recycling practice

# Algae cultivation

## Summary for stakeholders

Algae cultivation is one technique or way of valorizing manure and digestate. Algae are cultivated worldwide and can grow in all kinds of reactors (open pond raceway, cascade systems or closed tubular systems). The algae need light, CO<sub>2</sub> and nutrients, such as N, P and K. They produce biomass and O<sub>2</sub>. Algae can also be grown on other C sources (other than CO<sub>2</sub>), for example organic carbon sources such as sugars. The first mentioned systems whereas light and CO<sub>2</sub> are the input feedstocks is called heterotrophic. Autotrophic is a system wherein the algae are grown on other organic carbon sources, and light is not necessary. A combination of those systems is also possible, which is called mixotrophy. The algae are first cultivated in the presence of light and CO<sub>2</sub> as carbon source. After a while, the algae are switched sugar as the main carbon sources, which can be done in the dark or with light. The advantage of this systems is the allowance of different cultivation methods, such as a 'regular' dark reactor instead of a systems which allows a lot of natural or led lights. Digestate can be used as a source of nutrients for the algae. The benefit of growing algae on digestate or the liquid fraction of manure is to valorize a small part of the excess manure in the Netherlands and secondly CO<sub>2</sub> is captured by the algae. Cultivation of algae on manure or digestate would be best suitable as an on farm technique or installation. Part of the manure can be used for the algae and the algae produce biomass with a high protein concentration. The algae can be fed directly to cows, pigs or poultry. This would be an ideal situation, however algae installations are costly for a farmer. So, price and ease of operating would be crucial factors before an algae reactor can be operated on a farm. Furthermore, it is not possible to grow algae on manure or digestate and feed it directly to livestock. This is forbidden by law in the Netherlands for now.

Objective and context

Key elements and processes

## Practice objective and context

Algae can be grown on the liquid fraction of cattle manure or on digestate from anaerobic digestion. In these feed streams there are (still) nutrients and sugars, which can be used by the algae. These nutrients and sugars are valuable so that retrieving them is worthwhile. Thereby, the amount of waste is reduced. A lot of protein is tilled on the field for cattle feed (grass for example), using land which could also be used to till food for humans (feed/food topic). Cultivating proteins in algae can contribute to reducing the land needed for feeding animals.

Some algae species are on the lists of approved animal feeds. However there can be still a problem with the legislation within Europe, in case particles of the manure are harvested together with the algae. Within Europe the process of production should be safe. Algae sold abroad Europe are only tested as product. A farmer in Belgium with a cattle farm is an example of a farmer producing algae. He however does not use digestate as a fertilizer for the algae, but he uses a feed safe medium. In this way, he is able to sell his products as food. He makes algae ice cream, cheeses and many other products

## Practice description

Algae can be grown in multiple ways. See the short practice summary in the previous page. A two phase reactor is one of the possibilities already used on a small pilot scale, whereas digestate is used as a nutrient source in the culture. This work is done in the scope of ALG-AD, a European project who uses digestate to produce algae, in order to make the livestock industry more circular <https://www.alg-ad-dst.com/>. The liquid fraction of cattle manure or digestate is used as substrate. In the first phase algae are grown phototrophically autotrophically. Light is used as an energy source, CO<sub>2</sub> is used as carbon source and nutrients (mainly nitrogen (N) and phosphorous (P)) are used to grow algae (Fuentes-Grünwald et al., 2021). After this phase the algae are concentrated using membrane technology. During the second phase the algae are grown mixotrophically. During this phase microalgae use inorganic CO<sub>2</sub> as well as organic carbon sources in the presence of light to increase the biomass (Fuentes-Grünwald et al., 2021).

During these experiments, only a small percentage of the media is digestate, around 2%. The difficulty with digestate is it's dark color. Algae were grown in tubular closed loop reactors in the presence of light, a too dark medium blocks the light. Filtration of the digestate or a different cultivation method could be a possible solution for this problem. Van der Weide et al (2014) did experiments to cultivate algae with digestate. The digestate should be diluted but although still a bit dark the algae were able to grow on these diluted streams.

## Environmental effects

CO<sub>2</sub> (from air or concentrated) is used to let the algae grow. However, when the protein rich algae are used as feed for cattle than the cattle will produce methane (with a much higher GWP), so basically CO<sub>2</sub> is converted into CH<sub>4</sub> in the air. This is an environmental risk.

On the other hand, if feed for animals remains a must, then the alternative is tilling feed on the land. Here diesel is used for growing the crop, and in this case cattle also produces CH<sub>4</sub>. So in this case the greenhouse gas emissions are higher than when the feed is produced with algae cultivation.

Furthermore in case of using the manure of the cattle to produce green gas to increase on sustainability, smoke gas or other CO<sub>2</sub> gas streams in this process can be used for the algae cultivation.

Back to Catalogue

Download Practice

Figure 19: Nutrient Recycling Practices (Specific)

## 2.14 MainstreamBIO Resources (Audio/Visual Material)

Upon accessing the [MainstreamBIO Resources](#) page, users are presented with two distinct categories: audio/visual materials and bioeconomy profiles of seven EU rural communities. The first section, dedicated to audio/visual materials, features a collection of educational and promotional videos produced by project partners as part of the MainstreamBIO initiative. This content aims to provide valuable insights and raise awareness about the project's objectives, showcasing key developments and successes within the bioeconomy sector.

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— Explore additional resources, including audiovisual materials and the bioeconomy profile of 7 EU rural regions.

MainstreamBIO Resources

Audio/Visual material12

Bioeconomy profile of7EU rural regions

MAINSTREAMBIO VIDEO 1

Copy link

enhance the engagement of key rural actors

Watch on YouTube


MainstreamBIO Video 1



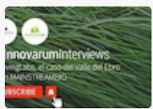
MainstreamBIO is an innovative European Union project that aims to revolutionize the field of biotechnology. By leveraging cutting-edge advancements in genetic engineering and synthetic biology, MainstreamBIO is committed to developing sustainable and eco-friendly solutions for a wide range of industries, from agriculture to healthcare.




All audio/visual material




MainstreamBIO Video 1




The case of the Ebro Spanish Valley with MainstreamBIO




MainstreamBIO Promo Video




"Hamsa Herbs"




Swedish MIP – Research institute of Sweden (RISE)




Bulgarian MIP




Spanish MIP




Polish MIP | InsignesLabs




Polish MIP | RibesTech



ACRES, Rommie van der Weide



Almeerse, Weerde Arjan Dekking



Danish MIP





Figure 20: MainstreamBIO Resources (Audio/Visual Material)

## 2.15 MainstreamBIO Resources (Bioeconomy profile of 7 EU rural communities)

The [Bioeconomy profile of 7 EU rural regions](#) page offers a rich collection of carefully curated resources designed to support bio-based initiatives, including detailed guidelines and instructional videos. Users can also explore in-depth bioeconomy profiles of seven rural communities across the EU — the [Netherlands](#), [Poland](#), [Denmark](#), [Sweden](#), [Bulgaria](#), [Spain](#), and [Ireland](#). These profiles provide valuable insights into regional characteristics, focus areas, resource use, and exemplary value chain models involving materials such as grass, manure, and pumpkin. Altogether, this resource hub serves as a practical and inspiring reference for those involved in bio-based projects.

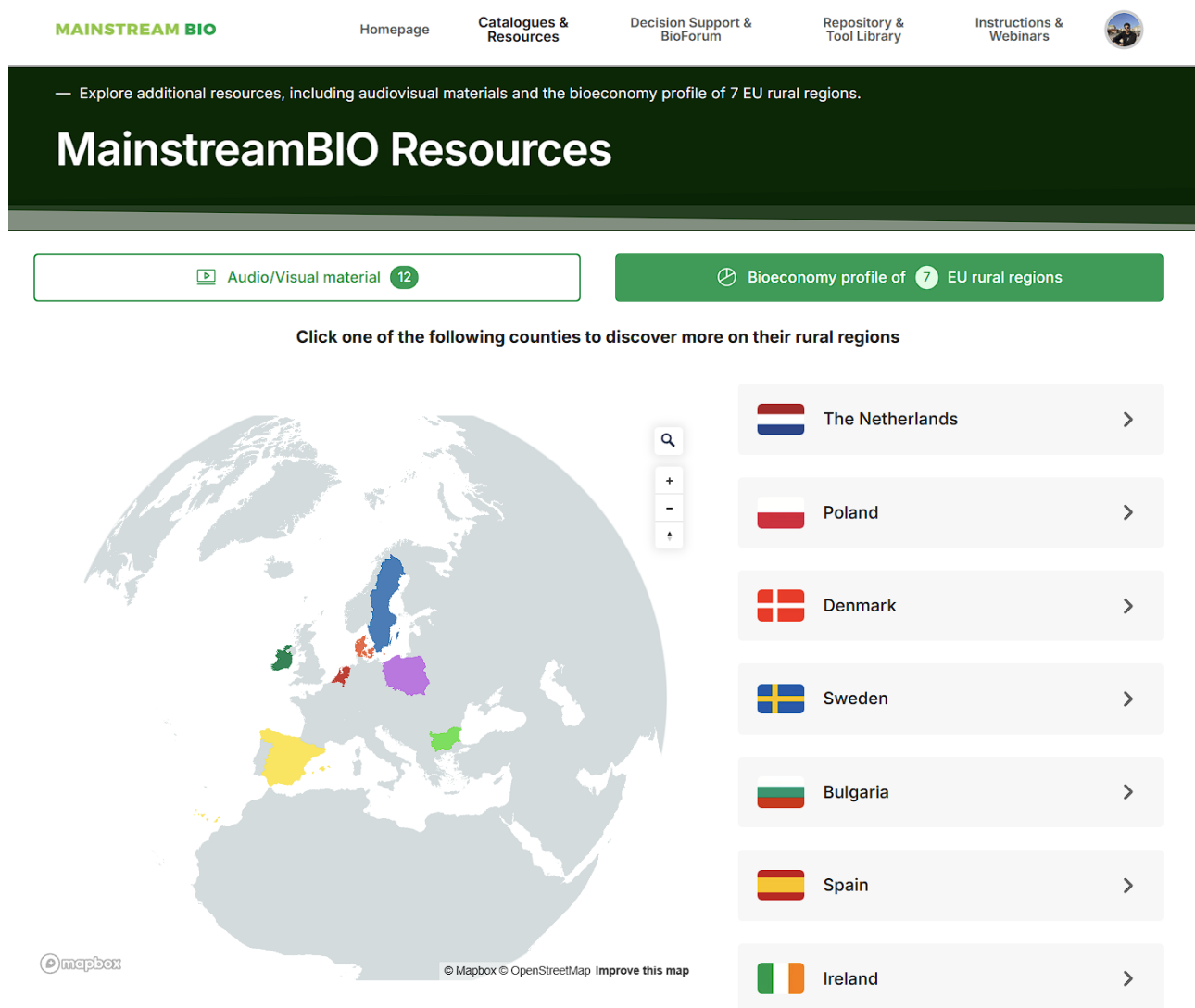


Figure 21: MainstreamBIO Resources (Bioeconomy profile of 7 EU rural communities)

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— Click one of the following topics to discover more on bioeconomy in

## The Netherlands

*i* General information

Regional needs for bioeconomy development

Regional barriers hindering bioeconomy development

Nutrient recycling practices applied in the region

Value chain example

Organizations



### Select Country

Netherlands

Poland

Denmark

Sweden

Bulgaria

Spain

Ireland

Figure 22: MainstreamBIO Resources (Bioeconomy profile of The Netherlands)

## 2.16 Decision Support System

The [Decision Support System](#) (DSS), developed in close collaboration with Wageningen Research (WR) through iterative feedback rounds, is a user-friendly, six-step tool designed to help users effectively plan and optimize the implementation of their bioeconomy projects. The process begins with logging in (Figure 23). The user starts with the Matching Table (Figure 24), which enables the effective pairing of feedstock types with suitable technologies and end-products. Subsequent steps include assessments of Social Impact (Figure 25), Economic Impact (Figure 26), Environmental Impact (Figure 27), and Implementation Requirements (Figure 28). At each stage, users are supported by contextual information accessible via an info button located above the rating dropdown, facilitating informed and evidence-based evaluations.

Additionally, users are encouraged to consult the provided arguments situated above the multiline input fields and contribute comments that clarify the anticipated influence of each criterion on their specific project pathway. The final step culminates in the presentation of a Radar Chart (Figure 29), offering a clear and visually engaging summary of the assessment outcomes. This chart enables users to quickly identify key strengths and potential areas for improvement across dimensions such as social impact, economic impact, environmental impact and requirements for implementation. All



user inputs can be exported and downloaded in PDF format (Figure 30), ensuring ease of documentation and further analysis.

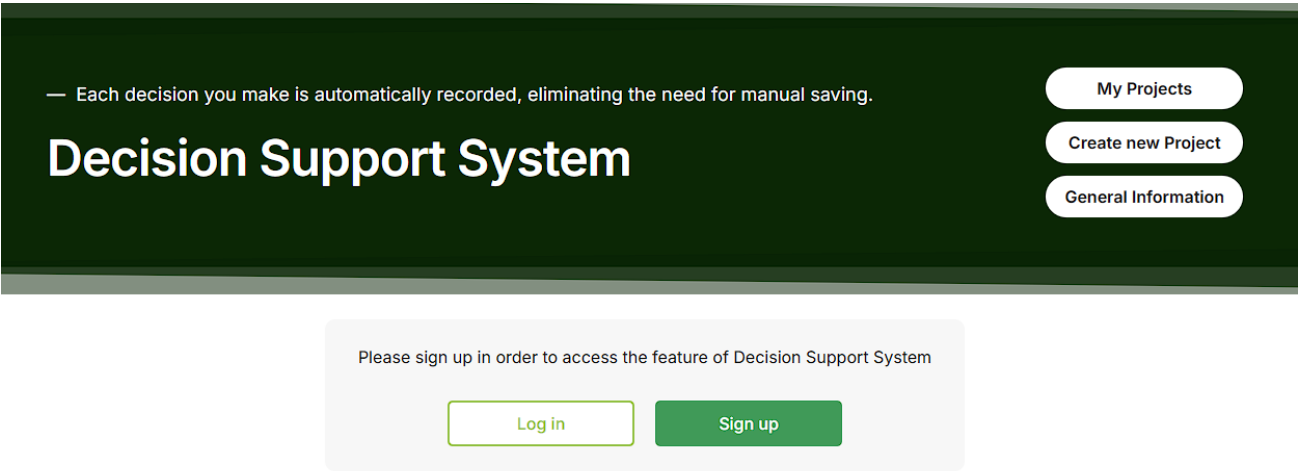


Figure 23: Decision Support System (User Not Logged In)

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— Each decision you make is automatically recorded, eliminating the need for manual saving.

# Decision Support System

My Projects

Projects shared with me

Create new Project

General Information

## My Projects

2 items

Project name	Date created	Step	Feedstock	Technology	Product	Duplicate	Share	Delete
Test Number 1 (Duplicate)	Apr 7, 2025 4:22 pm	Access social impact	Residues from industries producing semi-finished wood based panels, Bark residues from pulp and paper industry	Mechanical and thermomechanical disruption & fractionation (B8a)	Insulation materials			
Workshop example	Jan 3, 2024 12:26 pm	Matching table	Bark residues from pulp and paper industry, Grassy biomass from nature and landscape maintenance (recreational and nature protection areas, dykes)	Mechanical and thermomechanical disruption & fractionation (B8a), Forming of non-woven (B17), Cultivation Algae (B5b)	Insulation materials, Proteins			

## Projects shared with me

1 items

Project Name	Date created	Step	Feedstock	Technology	Product	Created by	Duplicate
Test Number 1	Nov 1, 2024 12:03 pm	Matching table	Cereals straw, Grassy biomass from nature and landscape maintenance (recreational and nature protection areas, dykes)	Aerobic conversion (composting) (B1)	Compost	peterk852010@gmail.com	

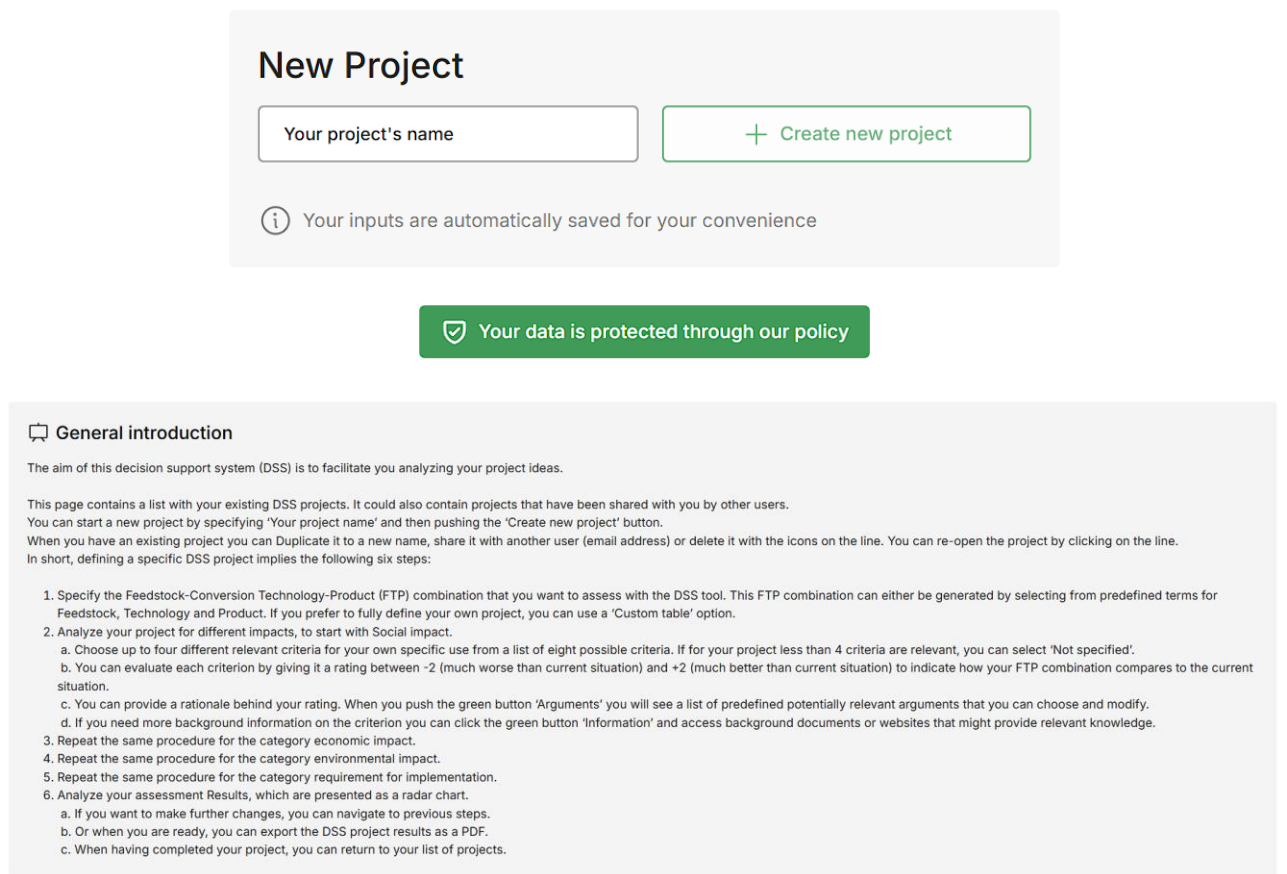


Figure 24: Decision Support System (User is Logged In and has made 2 previous DSS and another user has shared 1 DSS with him)

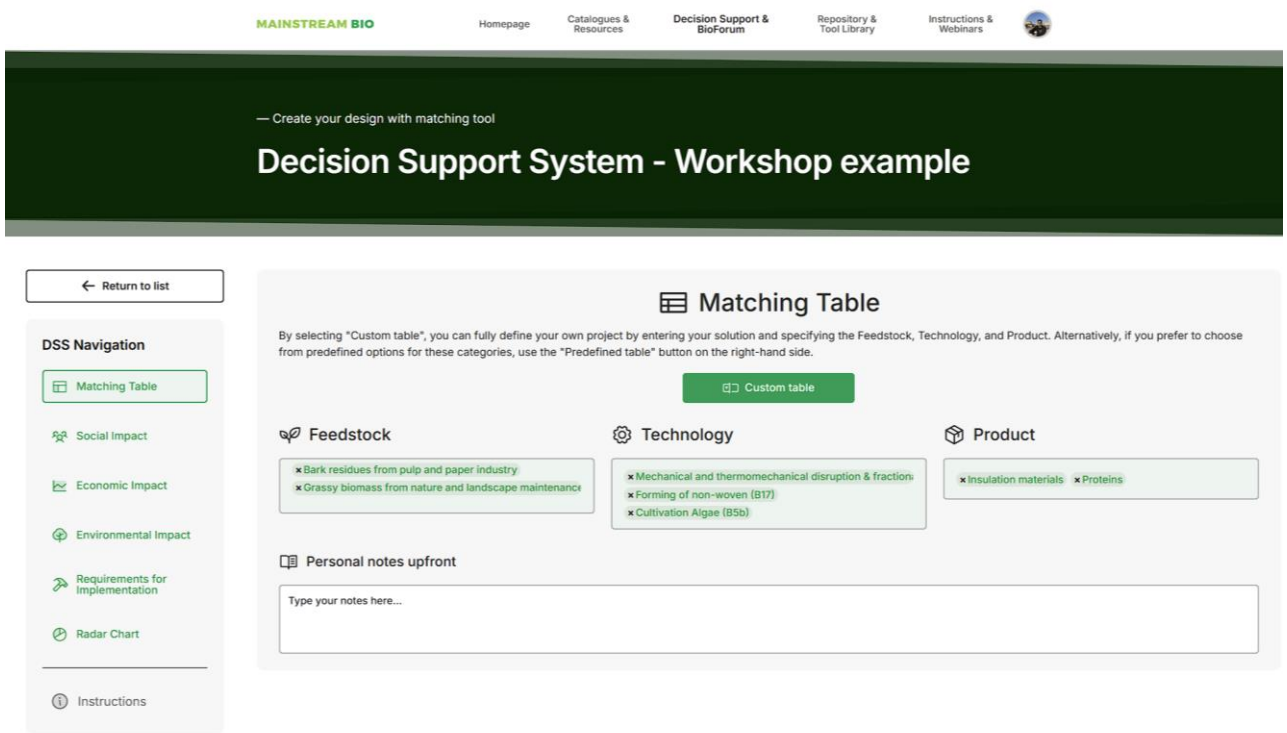


Figure 25: Decision Support System (Step 1: Matching Table)

← Return to list

**DSS Navigation**

- Matching Table
- Social Impact**
- Economic Impact
- Environmental Impact
- Requirements for Implementation
- Radar Chart
- Instructions

### 👤 Social Impact

Social impact refers to the significant effects and consequences that your project will have on people.

① Criterion	✦ Evaluation	<span>ⓘ</span> Information	<span>💬</span> Rationale	<input checked="" type="checkbox"/> Arguments
Creation of new jobs	-1.5		<ul style="list-style-type: none"> <li>Number of new jobs created</li> <li>Seasonal or permanent work</li> <li>Level of education required</li> </ul>	<input checked="" type="checkbox"/>
Not selected	0	<span>ⓘ</span> Information	Please select a criterion before entering arguments.	
Increased political attractiveness	0	<span>ⓘ</span> Information	No negative, but also not a huge effect	<input checked="" type="checkbox"/>
Increased social cohesion through cooperation	0	<span>ⓘ</span> Information	No extra education and training opportunities arise	<input checked="" type="checkbox"/>

Figure 26: Decision Support System (Step 2: Social Impact Assessment)

← Return to list

**DSS Navigation**

- Matching Table
- Social Impact
- Economic Impact**
- Environmental Impact
- Requirements for Implementation
- Radar Chart
- Instructions

### 📈 Economic Impact

Economic impact pertains to the measurable influence your particular project will exert on the financial aspects of the beneficiaries

① Criterion	✦ Evaluation	<span>ⓘ</span> Information	<span>💬</span> Rationale	<input checked="" type="checkbox"/> Arguments
Increased use of local biomass resources	2		A large biomass potential that was so far not used, is now brought to value	<input checked="" type="checkbox"/>
Increased rural business opportunities	0	<span>ⓘ</span> Information	Not negative, but also not a huge effect	
Increased resource use efficiency	1	<span>ⓘ</span> Information	The resource efficiency will improve, but could still be further improved	<input checked="" type="checkbox"/>
Increased profitability	1	<span>ⓘ</span> Information	The profitability will improve by the valorisation of the feedstock; however, the investment and operational costs are still relatively high	<input checked="" type="checkbox"/>

Figure 27: Decision Support System (Step 3: Economic Impact Assessment)

[← Return to list](#)

## Environmental Impact

Environmental impact refers to the repercussions and effects that your project will have in the ecosystem.

1

**Criterion**

Improvement of soil quality

**Evaluation**

-1

**Information**

**Rationale**

Without any further measures the soil quality could be reduced because of the removal of extra biomass and thus nutrients per ha  
Polluted soil regenerated

**Arguments**

2

**Criterion**

Improvement of water quality

**Evaluation**

0

**Information**

**Rationale**

No influence on the water quality, because no extra water is needed and removal of crop residues

**Arguments**

3

**Criterion**

Reduction of greenhouse gas emissions

**Evaluation**

1

**Information**

**Rationale**

Methane (CH4) emission reduction

**Arguments**

4

**Criterion**

Reduction of waste

**Evaluation**

0

**Information**

**Rationale**

The feedstock is not considered to be waste, so no change compared to the current situation

**Arguments**

Figure 28: Decision Support System (Step 4: Environmental Impact Assessment)

[← Return to list](#)

## Requirements for Implementation

Requirements for implementation outline the essential criteria that need to be satisfied to effectively execute your project

1

**Criterion**

Presence of sufficient biomass feedstocks

**Evaluation**

1

**Information**

**Rationale**

Biomass feedstocks are available in the group of users and can also be supplemented by supplies in the region

**Arguments**

2

**Criterion**

Presence of workforce with knowledge and skills to operate technologies

**Evaluation**

-1

**Information**

**Rationale**

Labourers still need to obtain the skills to operate the new technology

**Arguments**

3

**Criterion**

Presence of adequate infrastructure

**Evaluation**

2

**Information**

**Rationale**

No infrastructure is available yet for installing the new technology

**Arguments**

4

**Criterion**

Presence of enabling government policies & regulations

**Evaluation**

2

**Information**

**Rationale**

Regulations do not prohibit the application of the feedstock and policies favour rural development

**Arguments**

Figure 29: Decision Support System (Step 5: Requirements for Implementation Assessment)

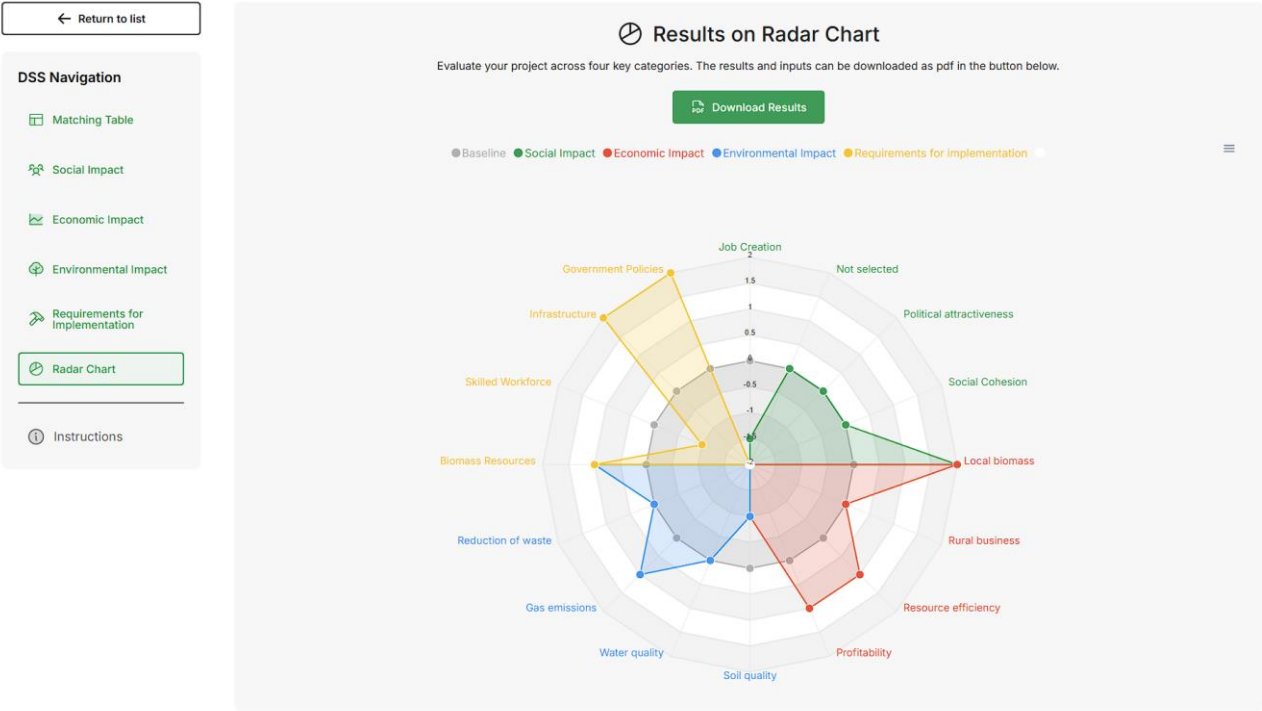


Figure 30: Decision Support System (Step 6: Radar Chart)

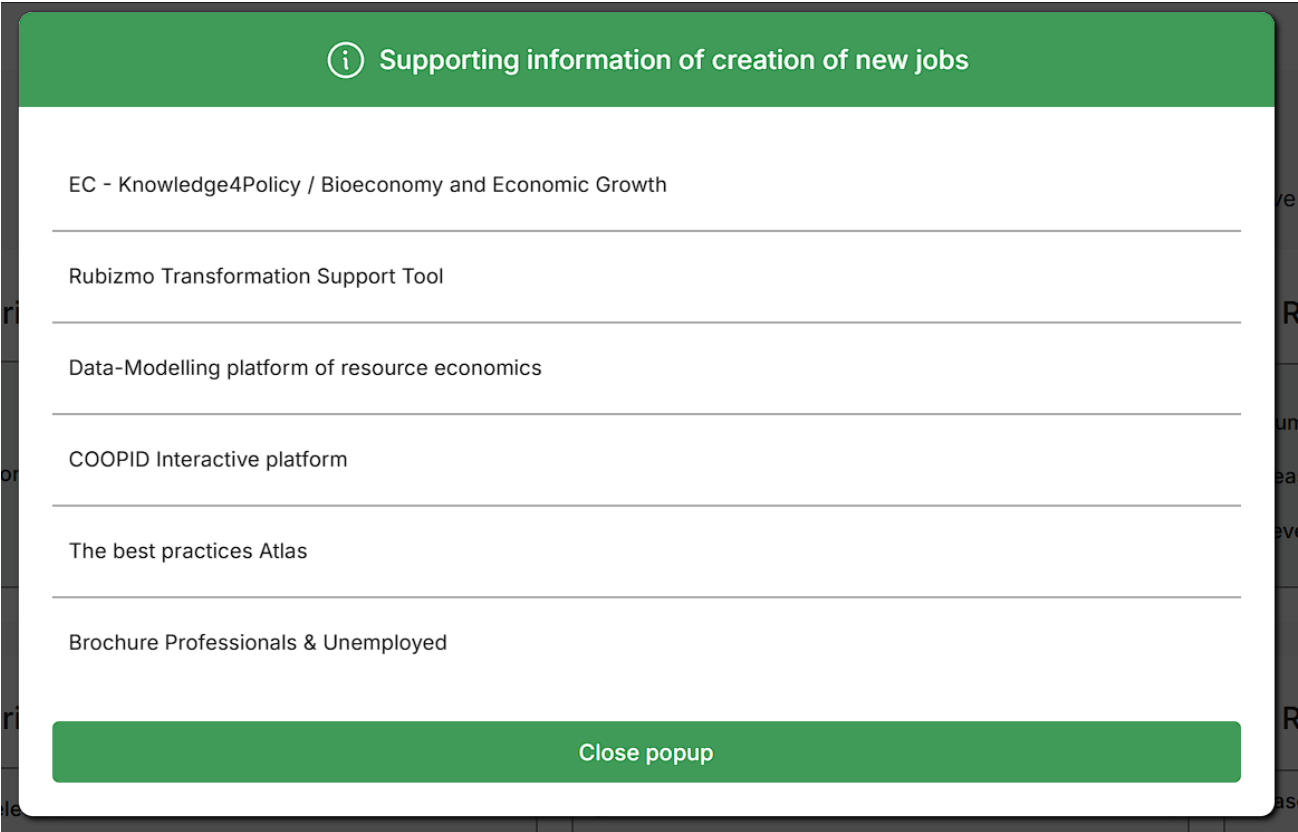


Figure 31: Decision Support System (Popup: Supporting Information)

### Possible arguments for creation of new jobs

By selecting the checkboxes in the arguments section, the text of each argument will be added to your rationale, helping you articulate your thoughts more effectively and speeding up the process.

Number of new jobs created	<input type="checkbox"/>
Seasonal or permanent work	<input type="checkbox"/>
Level of education required	<input type="checkbox"/>
Level of experience required	<input type="checkbox"/>
Availability of suitable candidates in region	<input type="checkbox"/>
Attractiveness of working conditions	<input type="checkbox"/>
Number of new jobs created for rural youth	<input type="checkbox"/>
Number of indirect jobs created (e.g. maintenance, cleaning, etc.)	<input type="checkbox"/>

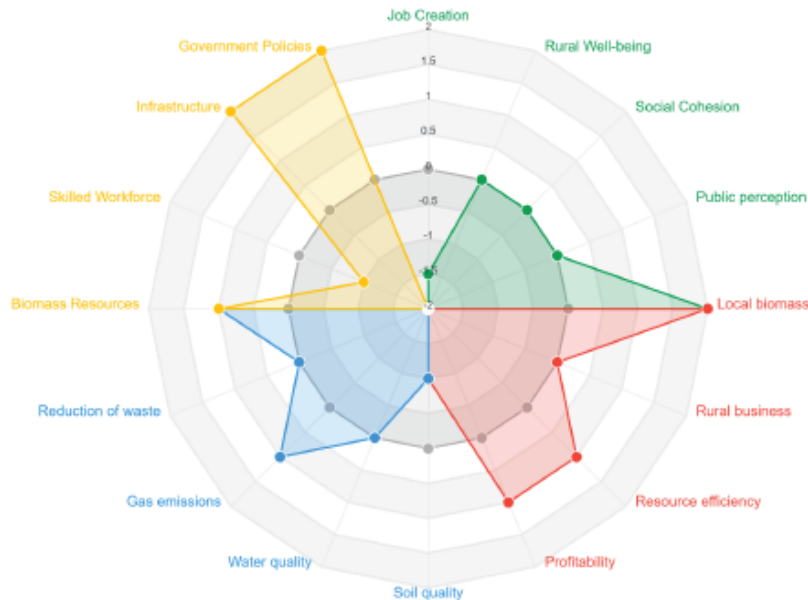
Continue

Figure 32: Decision Support System (Popup: Possible Arguments)



**MAINSTREAM BIO****Decision Support System (Peter Kafkias)**

● Baseline ● Social Impact ● Economic Impact ● Environmental Impact ● Requirements for implementation



*Criteria in graph are selected by designer, so criteria in graph may be different from graphs of other project designs. This means that graphs cannot be simply compared.*

**Feedstock**

Bark residues from pulp and paper industry, Grassy biomass from nature and landscape maintenance (recreational and nature protection areas, dykes)

**Technology**

Mechanical and thermomechanical disruption & fractionation (B8a), Forming of non-woven (B17), Cultivation Algae (B5b)

**Product**

Insulation materials, Proteins

**Personal notes upfront**

Funded by  
the European Union

1

Figure 33: Decision Support System (PDF Results)

## 2.17 BioForum

The [BioForum](#) serves as an interactive platform designed to facilitate collaboration among users and experts engaged in the development and application of bio-based solutions. While all content within the toolkit is publicly visible, interactive functionalities within the BioForum—such as posting, commenting, or uploading content—are accessible exclusively to logged-in users.

Once authenticated, users can actively participate in discussions, pose questions, share insights, and upload multimedia content including images and PDFs. They can also access relevant tools such as decision support systems and provide constructive feedback. To accommodate this wide range of contributions, the BioForum incorporates a rich text editor resembling standard word processing tools. This editor supports advanced formatting features, including headings, bold text, code blocks, bullet and numbered lists, indentation, hyperlinks, embedded images and videos, and more, thereby enhancing the clarity and expressiveness of user-generated content.

To support effective knowledge exchange and ensure streamlined access to relevant discussions, the platform includes robust and user-friendly search functionality. Users can locate content by performing keyword searches or by filtering results based on community categories and thematic tags.

The BioForum organizes discussions around six predefined communities of interest:

- Biomass Producers
- Business
- Civil Society
- General
- Policy Makers
- Researchers

In addition, contributions are categorized using a structured set of thematic tags that reflect critical focus areas within the bioeconomy, including:

- Bioeconomy Profile
- Business Model
- Decision Support System (DSS)
- LCA (Life Cycle Assessment)
- Nutrient Recycling
- Social Innovation
- Technology
- Tool
- Tutorial
- Value Chain

The search engine indexes all posts and comments, enabling the retrieval of content through matches with keywords, assigned tags, and community identifiers. This approach enhances content

discoverability and encourages cross-sectoral dialogue, fostering a dynamic and integrated knowledge-sharing environment across the bioeconomy ecosystem.

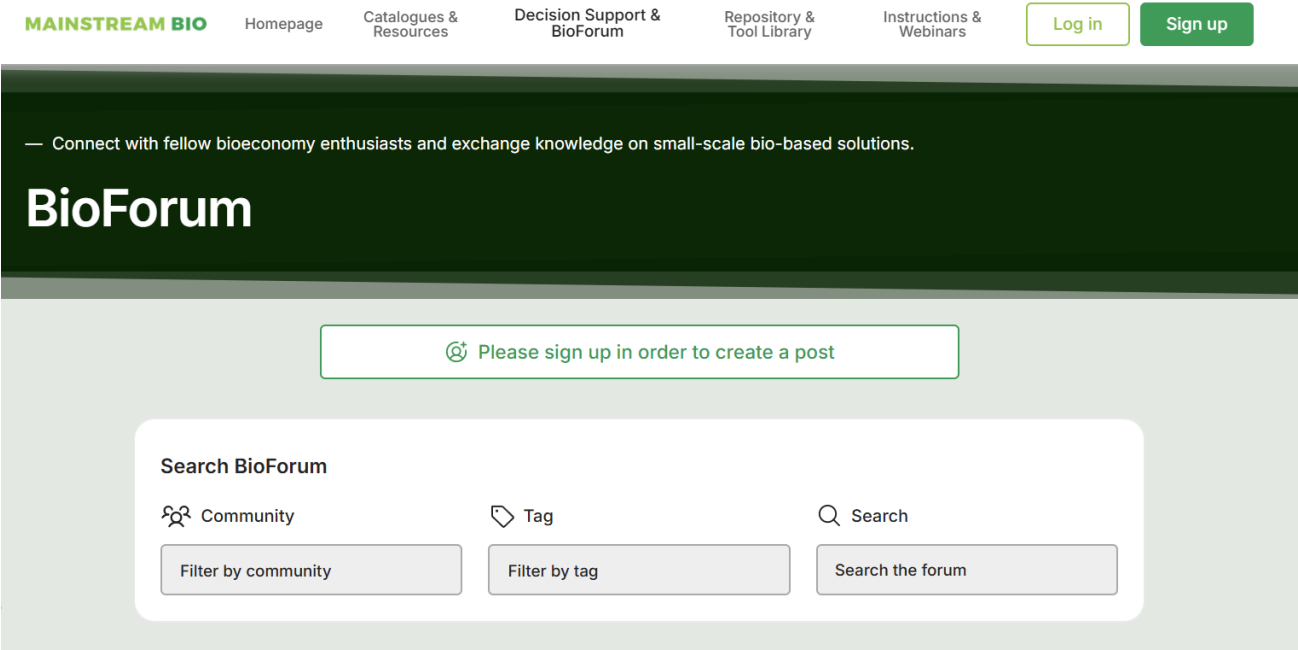


Figure 34: BioForum (User Not Logged In)

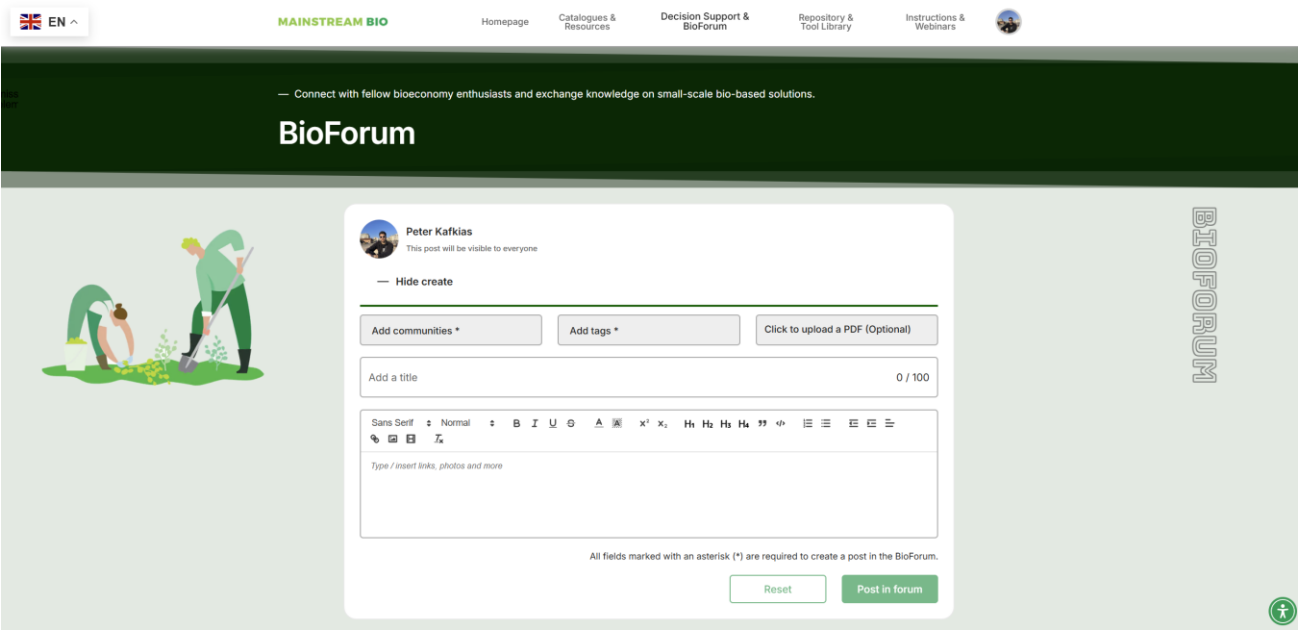


Figure 35: BioForum (Create Post)

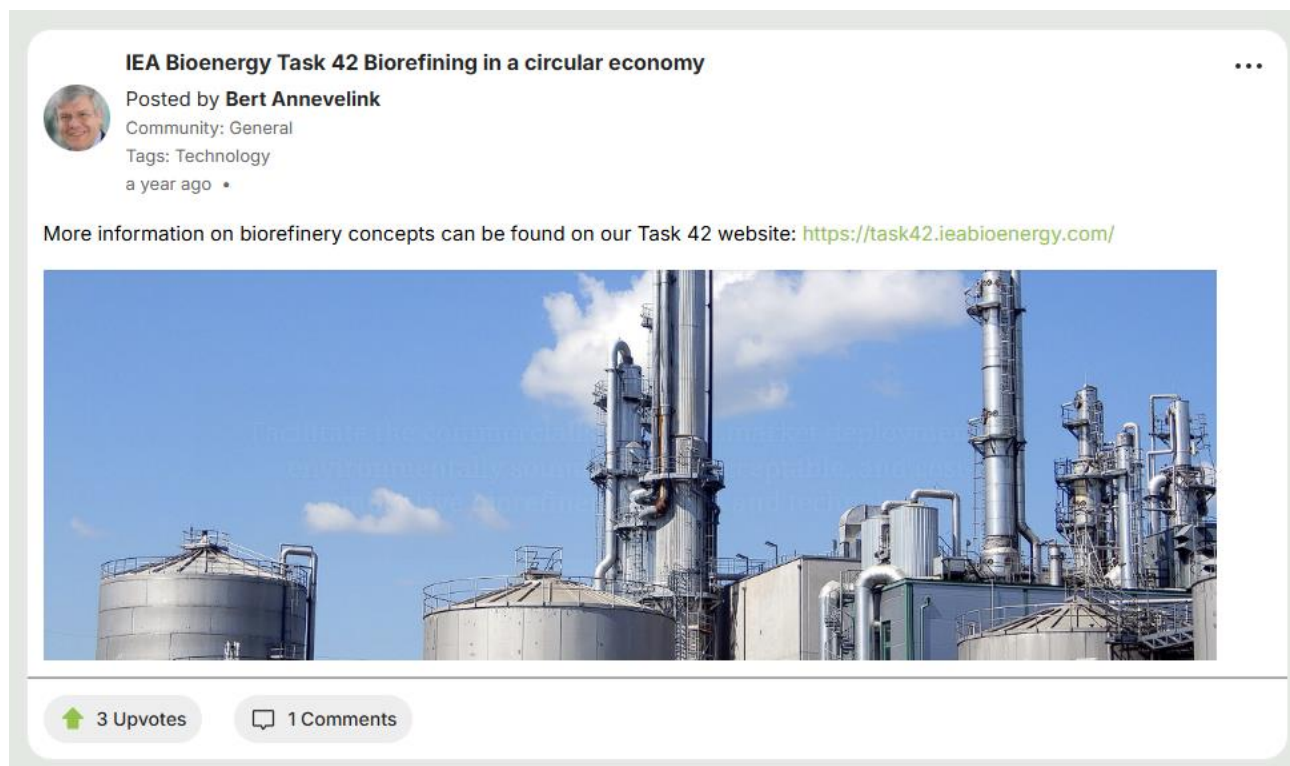


Figure 36: BioForum (User Logged In)

## 2.18 Bioeconomy Repository

The [Bioeconomy Repository](#) page offers users access to a comprehensive collection of resources covering a wide range of topics within the bioeconomy. The repository is structured into two main sections: audiovisual materials and supporting documentation.

The audiovisual section features a curated selection of fifteen (15) videos encompassing a variety of formats, including webinars, instructional content, and educational materials. These videos span diverse topics, stakeholder types, source initiatives, and publication years, offering users a multifaceted view of bioeconomy-related developments.

Complementing this is a substantial body of supporting documentation, comprising a total of five hundred and sixty-one (561) documents. Together, these materials provide in-depth knowledge and practical insights relevant to the bioeconomy landscape. To enhance usability, the repository includes a flexible filtering system that allows users to refine their searches based on category, stakeholder type, description, language, year, or keyword. This functionality ensures efficient navigation and access to targeted content. Serving as a dynamic knowledge hub, the Bioeconomy Repository equips users with the tools and information necessary to stay informed and engaged across multiple dimensions of bioeconomy.

Audio/Visual Material
 Supporting Documentation

You can further select by clicking on the topics below

## Success cases and best practices from brand owners switching from fossil-based to bio-based

Watch later
 Share

Climate change - Climate change refers to long-term shifts in temperatures and... >

Watch on
 YouTube

Success cases and best practices from brand owners switching from fossil-based to bio-based			
Stakeholder type  N/A	Source  EU-funded Project	Initiative  BIOSWITCH	Year  2021

### All audio/visual material

Success cases and best practices from brand owners switching from fossil-based to bio-based	Developing a pyrolysis based biorefinery (webinar)	Choosing the right biomass feedstock strategy (webinar)	Bio-based products from fast pyrolysis oil (webinar)	The bioeconomy in our everyday lives - BIOWAYS video
Promoting organic farming in Spain: the ECOPIONET project	How sustainable is 'bio-based' anyway? (webinar)	The Bioeconomy - a rural area approach	The Potential of Grassland! What comes to your mind when you think of grass?   EU SCIENCE	Educational gaps and skills mismatch in the European Bioeconomy
Introduction to the EU Bioeconomy career opportunities	The blue bioeconomy	Webinar: COVID-19 and the Bioeconomy	Reed canary grass, a new bedding alternative for cows, pigs and horses	The Green Revolution, how Danish Grass replaces Soy in Animal Feed   EU SCIENCE

Figure 37: Bioeconomy Repository (Audio/Visual Material)

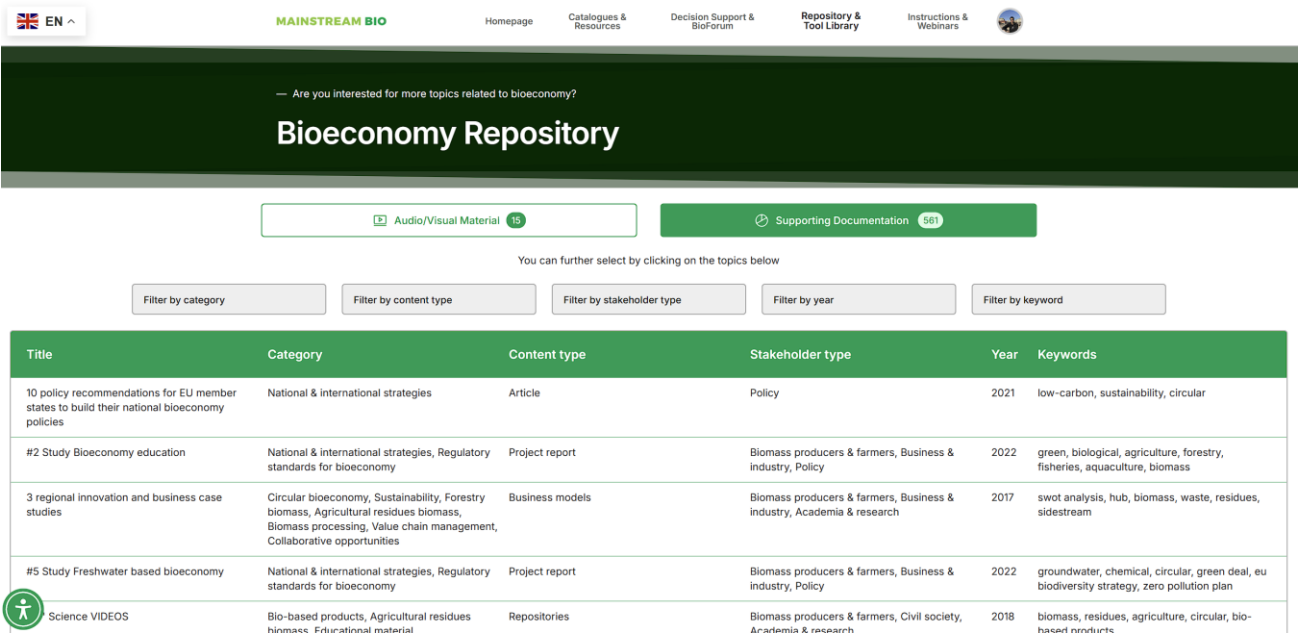


Figure 38: Bioeconomy Repository (Documentation)

## 2.19 Tool Library

The [Tool Library](#) page offers users access to a diverse selection of tools specifically designed to support the planning, implementation, and monitoring of bio-based projects. These tools aim to enhance decision-making and promote optimal sustainability throughout the project lifecycle, providing practical support for stakeholders across the bioeconomy value chain.

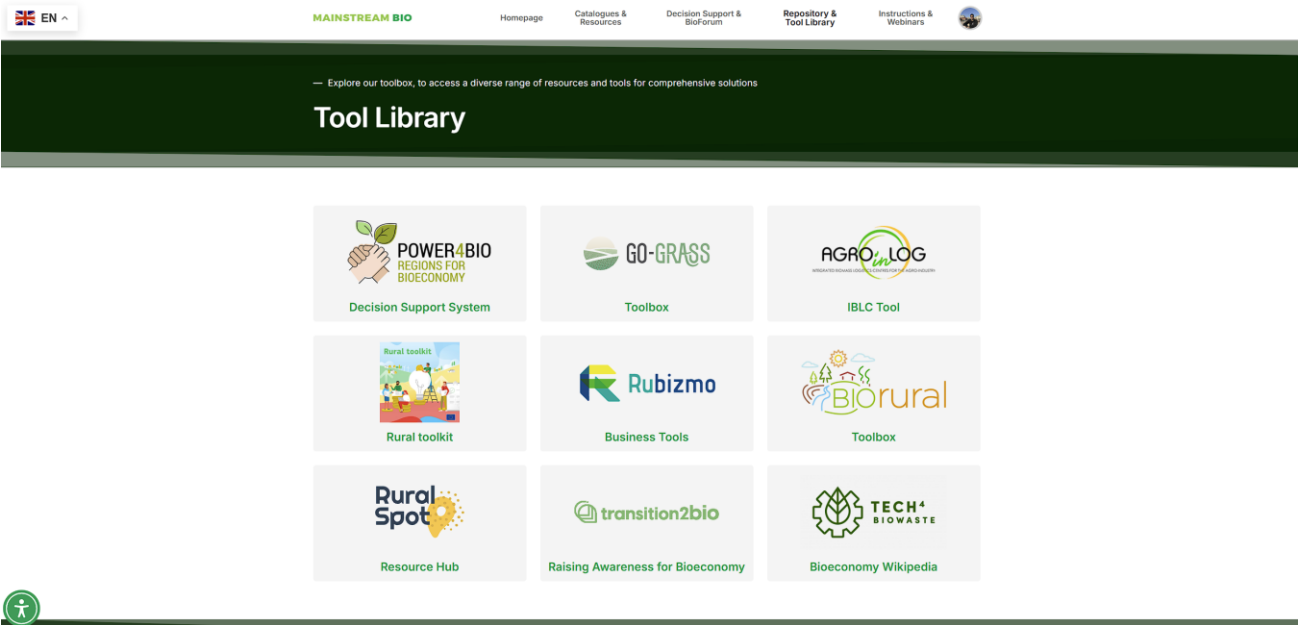


Figure 39: Tool Library



## 2.20 Instructions

The [Instructions](#) page provides users with a comprehensive overview of the functionalities and navigation of the digital toolkit. It features both audiovisual material and written guidelines, ensuring that users can easily understand and engage with the platform's tools and resources, regardless of their preferred learning style.

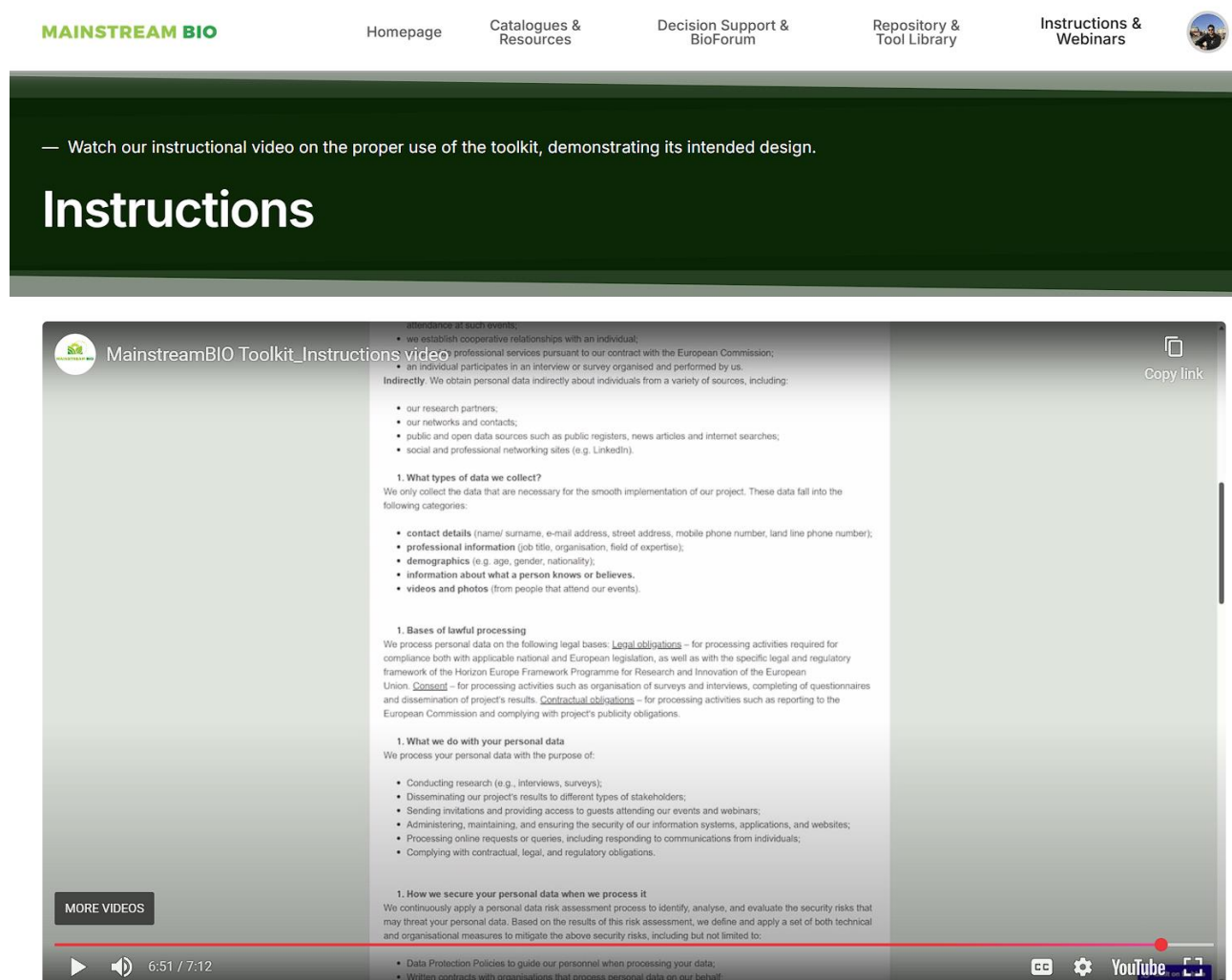


Figure 40: Instructions

## 2.21 Webinars

The [Webinars](#) page provides users with access to a comprehensive collection of webinars hosted within the framework of the MainstreamBIO project. A total of ten (10) webinars were conducted, each focusing on a distinct topic relevant to the bioeconomy. For each webinar, the digital toolkit includes the title, a detailed description, and an accompanying information sheet, offering users valuable insights and context for further exploration.

EN

**MAINSTREAM BIO**

[Homepage](#)

[Catalogues & Resources](#)

[Decision Support & BioForum](#)

[Repository & Tool Library](#)

[Instructions & Webinars](#)

— Access a comprehensive collection of webinars hosted under the MainstreamBIO project framework.

# Webinars

**Webinar 1: "Introduction to Bioeconomy"**

## Converting biomass to bio-based products

IEA Task 42

Lange et al., (2022) Business Models, Including Higher Value Products for the New Circular, Resource-Efficient Bio-based Industry

[Watch on YouTube](#)

### Introduction to Bioeconomy

The circular bioeconomy plays an important, broad and sustainable role in building sustainable, resilient and revitalized rural and coastal communities, through improved use of local resources in order to reduce global environmental degradation. This webinar introduces bioeconomy for beginners and is also geared towards the role of primary producers and local communities to bring positive economic, environmental and social benefits and opportunities to primary producers and rural and coastal communities.

- The topics which are covered by specialists in bioeconomy development are:
- 1) An introduction to the bioeconomy and the central role of primary producers
  - 2) Bioeconomy as a framework for meeting policy targets and sectoral challenges
  - 3) Bioeconomy implementation and the participation of primary producers
  - 3) Insights in the successful stories of Bazancourt Biorefinery

[Download Information Sheet](#)

### All webinars

<b>Webinar 1</b> Introduction to Bioeconomy	<b>Webinar 2</b> Small-scale bio-based solutions for primary producers	<b>Webinar 3</b> Nutrient recycling solutions for primary producers	<b>Webinar 4</b> Opportunities for circular bioeconomy	<b>Webinar 5</b> Business Model and Social Innovations
<b>Webinar 6</b> Bioeconomy tools to support primary producer participation in the bioeconomy	<b>Webinar 7</b> Empowering Rural & Coastal Women in the Innovation & Leadership in Primary Production	<b>Webinar 8</b> Women Industrial Leaders in Agriculture, Marine Beauty, and Bio-based Fashion Textiles	<b>Webinar 9</b> Impact and Importance of involvement the youth in the bioeconomy sector	<b>Webinar 10</b> Empowering Bio-Consumers: Sustainable Choices for Health, Wellness & Future Generations

MAINSTREAM BIO  
Mainstreaming small-scale bio-based solutions in rural Europe

### CONTEXT

The bioeconomy harnesses using renewable biological resources from land and sea, like crops, forests, fish, animals and micro-organisms to produce food, materials and energy. Within the bioeconomy various primary and by-product biomass sources from agriculture, forestry and the marine can be converted into everyday essential materials, including food that we eat, energy to heat our homes, clothes that we wear and everyday household products. The bioeconomy can help society to shift away from its dependence on fossil fuels and products, since many of these can already be produced from biomass sources. A sustainable bioeconomy can therefore help to the climate objectives of the Paris agreement.

### BIOECONOMY AND CIRCULAR ECONOMY

A sustainable bioeconomy is also the renewable segment of the circular economy, since process residues can be converted into valuable resources, and sustainable everyday materials which can allow consumers, industry, retailers and primary producers to become more sustainable. Technology solutions, such as biorefineries, can convert primary or residual materials through a range mechanical, biological, chemical and thermochemical processes to produce different material and energy end products.

### Products from the bioeconomy

Everyday we interact with the bioeconomy in ways which we are sometimes unaware. When we wake in the morning, the bed we sleep in, the breakfast we eat, the skin cream and clothes we wear are all products of the bioeconomy. In addition, innovators within the bioeconomy are always looking for new opportunities in which bioeconomy products can solve the challenges we face. For example, developing bioplastic packaging which can be composted or can increase the shelf life of products. Or developing processes for converting food waste into insect protein feed. Or developing jet fuel to reduce our dependence of fossil fuels in aviation. The possibilities for bio-based product innovation is ever expanding with more and more markets developing.

**MainstreamBIO Educational and Awareness Raising Campaign**

**Topic 1**  
Introduction to the Bioeconomy

**April 10<sup>th</sup> 2024**

Funded by the European Union

Figure 41: Webinars

## 2.22 Account

The [Account](#) page, accessible exclusively to logged-in users via the profile icon on the right side of the header, serves as the central hub for managing personal settings and preferences. Within this section, users can update various aspects of their profile and account.

By hovering and clicking over their current profile picture, users can upload a new image. In the "My Account" tab, they can modify their email address and username. The "Account Security" tab provides options to change the account password or permanently delete the account. Additionally, the "Privacy Policy" tab offers direct access to the platform's privacy policy for user review.

The "Rate Us" tab invites users to provide feedback on their experience with the digital toolkit. Users can rate the toolkit from one (1) to five (5) stars in response to the following three (3) questions:

- How likely are you to recommend our toolkit to others?
- How satisfied are you with the toolkit and its features?
- How easy was it to navigate our toolkit?

A free-text input field is also available for users to submit additional comments or suggestions, contributing to the ongoing enhancement of the toolkit's usability and effectiveness.

The screenshot displays the 'My account' section of the MainstreamBIO Digital Toolkit. On the left, a user profile card for Peter Kafkias includes a profile picture, a greeting, and two buttons: 'Join the conversation' and 'Make informed decisions'. Below this is a sidebar menu with 'My account' selected, and options for 'Account security', 'Privacy policy', and 'Rate us'. The main area features a 'My activity in the MainstreamBIO Digital Toolkit' grid with eight categories: Catalogues (11/68), Recycling (1/31), Resources (19/10), DSS (4), BioForum (13), Repository (5/561), Tools (1/9), and Webinars (6/6). At the bottom, the 'My account' form allows updating the 'Username' (currently Peter Kafkias) and 'E-mail' (currently pkafkias@draxis.gr), with a 'Save changes' button.

Category	Value
Catalogues	11/68
Recycling	1/31
Resources	19/10
DSS	4
BioForum	13
Repository	5/561
Tools	1/9
Webinars	6/6

**My account**

**Username**  
This name will appear in the BioForum. You can change it whenever you want.


Username  
Peter Kafkias


**E-mail**  
We'll use this email address to send you updates and notifications.


E-mail  
pkafkias@draxis.gr


Save changes

Figure 42: Account My account Tab

 My account

 Account security

 Privacy policy

 Rate us

### Account security

You have the option to reset your password here. Please ensure that your new password is different from your current one.

Current password

Enter current password

New password

Enter new password

Confirm new password

Re-enter new password

Change password

### Account deletion

Once deleted you can't recover your account and your data will be removed.





Please enter your password to delete your account

Password

Enter your current password

Delete account

Figure 43: Account Security Tab

 My account
 Account security
 <b>Privacy policy</b>
 Rate us

## Privacy policy

This Privacy Policy applies to MainstreamBIO project website and governs personal data collection and use by the website only. MainstreamBIO project is committed to being transparent and to ensuring your privacy is protected. By using our website, you consent to personal data practices described below. MainstreamBIO project Privacy Policy is effective from 22/12/2022. We reserve the right to update or change the policy at any time, therefore you may want to review it periodically.

### 1. How we collect your personal data

We collect personal data both directly and indirectly:

**Directly.** We obtain personal data directly from individuals in a variety of ways, including but not limited to the following cases:

- an individual subscribes to our newsletter/s;
- an individual registers to attend in meetings and/or events (e.g. conferences, webinars, etc.) we host and during attendance at such events;
- we establish cooperative relationships with an individual;
- we provide professional services pursuant to our contract with the European Commission;
- an individual participates in an interview or survey organised and performed by us.

**Indirectly.** We obtain personal data indirectly about individuals from a variety of sources, including:


- our research partners;
- our networks and contacts;
- public and open data sources such as public registers, news articles and internet searches;
- social and professional networking sites (e.g. LinkedIn).

### 2. What types of data we collect?

We only collect the data that are necessary for the smooth implementation of our project. These data fall into the following categories:

contact details (name/ surname, e-mail address, street address, mobile phone number, land line phone number);  
 professional information (job title, organisation, field of expertise);  
 demographics (e.g. age, gender, nationality);  
 information about what a person knows or believes.  
 videos and photos (from people that attend our events).

Figure 44: Account Privacy policy Tab



Hello, Peter Kafkias

Join the conversation

Make informed decisions

- My account
- Account security
- Privacy policy
- Rate us

### My activity in the MainstreamBIO Digital Toolkit

Catalogues

11/68

Recycling

1/31

Resources

19/10

DSS

4

BioForum

13

Repository

5/561

Tools

1/9

Webinars

6/6

### Rate us

How likely are you to recommend our toolkit to others?

★★★★★★

How satisfied are you with the toolkit and its features?

★★★★☆

How easy was it to navigate our toolkit?

★★★★★★

Tell us how we can improve

This is great


 Your inputs are automatically saved for your convenience

Figure 45: Account Rate us Tab



### 3. Conclusion

The development and deployment of the MainstreamBIO digital toolkit marked a significant milestone in the project's efforts to promote the uptake of small-scale bio-based solutions across rural Europe. Designed as an integrated and user-centric platform, the toolkit brought together nine core components including a Catalogue of Technologies, Business Models and Social Innovations, a Decision Support System (DSS), the BioForum, a Bioeconomy Repository, and others, to support stakeholders in exploring, understanding, and implementing circular bioeconomy practices adapted to their local contexts.

Throughout its development, the project generated valuable insights into collaborative digital innovation within a multi-partner Horizon Europe setting. One of the most impactful lessons was the strategic advantage of using no-code platforms. Leveraging Bubble.io allowed the team to rapidly prototype, test, and iterate functional versions of the toolkit without relying on heavy software development resources. This approach accelerated delivery timelines and enabled participation from both technical and non-technical contributors.

The inclusion of embedded educational content also played a crucial role in enhancing user engagement. Webinars, tutorial videos, step-by-step guides, and downloadable resources made the platform more dynamic, accessible, and useful to a diverse set of users, accommodating different learning preferences and levels of familiarity with bioeconomy topics.

Strong cross-partner coordination proved essential for the success of the toolkit. Given its wide-ranging content and technical components, the project required clear role definitions, close collaboration among content providers and developers, and alignment through regular review cycles. Structured co-design sessions and iterative planning ensured coherence across all components.

User feedback was another critical driver of improvement. Initial user requirements were collected through a detailed survey, and the insights gathered were directly incorporated into the toolkit's design and functionality. This early engagement with end users ensured that the toolkit was tailored to their real-world needs and priorities.

Collaborative design tools such as Figma and Whimsical further enhanced coordination across the consortium. These tools improved communication between technical and non-technical team members by providing a shared visual language for discussing layouts, wireframes, and user flows, thereby reducing the potential for misunderstandings and delays.

Ensuring consistency in user interface (UI) and user experience (UX) design was also a key focus. The toolkit's visual and functional alignment with the broader MainstreamBIO project identity contributed to a seamless, intuitive experience. Modern design choices, such as reduced visual clutter, clearer page hierarchy, and more structured alerts, improved both usability and visual appeal.

During the final phase, the project team launched a targeted improvement initiative based on feedback collected through co-creation workshops, pilot cases such as Sakana, and the "Helpful Feedback" feature embedded in the platform. Enhancements included a redesigned homepage, clarification of instructional content (especially within the DSS), new video tutorials, and additional curated content in the BioForum to stimulate meaningful discussion and peer exchange.











By combining stakeholder-driven design with iterative development, the final version of the MainstreamBIO digital toolkit delivered a robust, inclusive, and engaging digital environment. It played a central role in supporting rural actors in identifying and implementing small-scale bio-based innovations and contributed to the emergence of sustainable and circular bioeconomies at local and

regional levels. The knowledge and practices gained through its development offer a replicable model for similar EU-funded digital initiatives in the future.

# The project

MainstreamBIO is an Horizon Europe EU funded project, which sets out to get small-scale bio-based solutions into mainstream practice across rural Europe, providing a broader range of rural actors with the opportunity to engage in and speed up the development of the bioeconomy. Recognizing the paramount importance of bioeconomy for addressing key global environmental and societal challenges, MainstreamBIO develops regional Multi-actor Innovation Platforms in 7 EU countries (PL, DK, SE, BG, ES, IE & NL). The project aims to enhance cooperation among key rural players towards co-creating sustainable business model pathways in line with regional potentials and policy initiatives. MainstreamBIO supports 35 multiactor partnerships to overcome barriers and get bio-based innovations to market with hands-on innovation support, accelerating the development of over 70 marketable bio-based products and services. Furthermore, the project develops and employs a digital toolkit to better match bio-based technologies, social innovations and good nutrient recycling practices with available biomass and market trends as well as to enhance understanding of the bioeconomy with a suite of educational resources building on existing research results and tools. To achieve these targets, MainstreamBIO involves 10 partners across Europe, coming from various fields. Thus, all partners combine their knowledge and experience to promote the growth of bioeconomy in a sustainable and inclusive manner.

Coordinator: Q-PLAN INTERNATIONAL ADVISORS PC (Q-PLAN)

Partner		Short Name
	Q-PLAN INTERNATIONAL ADVISORS PC	Q-PLAN
	MUNSTER TECHNOLOGICAL UNIVERSITY	MTU
	STICHTING WAGENINGEN RESEARCH	WR
	INSTYTUT UPRAWY NAWOZENIA I GLEBOZNAWSTWA, PANSTWOWY INSTYTUT BADAWCZY	IUNG
	RISE PROCESSUM AB	PROC
	AGRAREN UNIVERSITET - PLOVDIV	AUP
	FBCD AS	FBCD
	EURIZON SL	INN
	DRAXIS ENVIRONMENTAL SA	DRAXIS
	WHITE RESEARCH SPRL	WHITE

**CONTACT US** [info@mainstreambio-project.eu](mailto:info@mainstreambio-project.eu)

**VISIT** [www.mainstreambio-project.eu](http://www.mainstreambio-project.eu)



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