

D6.11 – Training plan and report (1st version)

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¹ PU – Public, fully open, e.g. web (Deliverables flagged as public will be automatically published in CORDIS project's page)

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Executive Summary

This report outlines Deliverable 6.11-Training plan and report, 1st version (D6.11), a part of the BIO4EEB project's comprehensive strategy under Work Package 6 (WP6) to promote the adoption of bio-based thermal insulating materials through tailored training programs. This deliverable is the initial instalment in a series of three documents aimed at developing and refining educational content and methodologies to enhance energy efficiency in the construction sector using bio-based materials.

D6.11 establishes the first lines of a robust BIO4EEB training framework that targets construction and energy efficiency practitioners and small and medium enterprises (SMEs), enhancing their understanding and capabilities of implementing bio-based building solutions to better contribute to the sustainability transition in the sector. The document discusses the basis to develop user-friendly training materials, including YouTube videos, brochures, infographics, and guidelines corresponding to the specific needs of the industry.

Under the leadership of partners EBC, R2M, SOPHIA, AIMPLAS, INDRE, and GOYER, this deliverable focuses on creating accessible educational content that simplifies the technical complexities of bio-based materials. These materials are intended to elevate industry knowledge and foster widespread acceptance and application of sustainable building practices. D6.11 aims thus at being instrumental in establishing the groundwork for a transformative shift towards sustainable construction practices. This deliverable plays a crucial role in achieving the broader objectives of the BIO4EEB project, setting the stage for continuous improvement and adaptation in future updates.

This document, as the first in the sequence, sets the foundational strategies and outlines initial training activities. It will be followed by D6.12, scheduled for submission in M30 (June 2025), and D6.13, due by M42 (June 2026). Each subsequent deliverable will incorporate feedback from earlier phases and introduce more detailed and advanced training content, ensuring the program evolves in response to the dynamic needs of the industry and the ongoing advancements in bio-based technologies.

Disclaimer

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Abbreviations and Acronyms

Abbreviation	Description
EBC	The European Builders Confederation
SMEs	Small and Medium Enterprises
PLA	Polylactic Acid
nZEB	Near Zero-Energy Building
OITBs	Open Innovation Test Beds
Deliverable 2.3– Socio-economic assessment and end users' segmentation	D2.3
Derivable 4.1 - Demo-cases contextualisation report	D4.1
Derivable 6.6–Plan for dissemination and exploitation report	D6.6
Deliverable 6.11-Training plan and report (1st version)	D6.11
WP6 – Dissemination and communication	WP6

*The text of this deliverable contains a lot of abbreviations and acronyms. For practical reasons most of them are explained and described directly below in the text.

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1 Introduction

1.1 Background

Deliverable 6.11, as a part of work package 6 - Dissemination and communication (WP6) of the BIO4EEB project, is dedicated to developing a comprehensive training program under Subtask 6.3.4. Training. This deliverable focuses on transforming the extensive body of knowledge produced by the BIO4EEB project into actionable and user-friendly training materials. These materials are designed to promote the adoption and effective application of bio-based building materials, specifically those related to Posidonia-related insulation elements, addressing the urgent need for sustainable building practices.

1.2 Aims and objectives

The main objective of D6.11 is to catalyse a shift towards bio-based building materials to mitigate the impact of the current shortage in traditional insulation materials, a situation intensified by the energy crisis linked to the Russia-Ukraine war. The deliverable aims to equip stakeholders, particularly SMEs in the construction sector, with the knowledge and the tools, necessary to implement bio-based building solutions efficiently and sustainably.

1.3 Structure and Content of the Training Program

- **Module Development:** The training modules will detail the properties and advantages of bio-based building materials, showcasing their application techniques and compliance with environmental standards. This will include the creation of short explanatory YouTube videos, brochures, infographics, and guidelines developed by BIO4EEB partners SOPHIA, AIMPLAS, INDRE, and GOYER leading the research and testing tasks of the project.
- **Practical Applications:** training sessions will be conducted to demonstrate the practical application of bio-based building materials in diverse environmental and architectural contexts. These sessions will be part of three physical information days organized across strategic EU countries.

1.4 Implementation Strategy

The training program will initially be tested among BIO4EEB project partners to refine methodologies and content based on direct feedback. Following successful internal testing, the refined training program will be extended to a broader audience throughout Europe, leveraging established networks and partnerships.

1.5 Evaluation and Future Adaptations

Feedback mechanisms and performance assessments will be integral throughout the training sessions to monitor and evaluate the effectiveness of the training modules. This continuous evaluation will inform necessary updates and adaptations to the training content, ensuring it remains aligned with the latest developments in bio-based building technologies and the evolving needs of the industry.

2 Introduction of the BIO4EEB technology

The training is designed to empower key industry stakeholders, enabling them to leverage bio-based building solutions efficiently. Partners SOPHIA, AIMPLAS, INDRE, and GOYER will collaborate to produce a diverse range of training materials, including digital content and printed resources, to ensure comprehensive coverage and accessibility.

1. Bio-based building Materials and Components:

- Posidonia Panels and Fibers: Utilized as core materials for insulation, these panels are made from the Posidonia oceanic seagrass, known for its natural insulation properties.
- Complex Polyelectrolytes (PECs) and Bio-Polyurethane: Developed for use in bio-based windows and as sprayable foam, offering improved insulation and reduced environmental impact compared to conventional materials.
- Prefabricated Façade Elements: These incorporate various bio-based materials to provide modular, easy-to-install solutions for building renovations.

Figures 1 and 2 are provided below as examples of BIO4EEB building materials and components.



Figure 1. Bio-based PUR formulation spraying



Figure 2. bio-based polyurethane window prototype

2. Digital and Analytical Tools:

- BIM (Building Information Modelling) Tools: Enhanced to support Circular BIM (C-BIM) practices, these tools help in planning and visualizing the construction process, integrating material circularity into the design and execution stages.
- AI and Blockchain Technologies: Used for robust identification and traceability of materials, ensuring the authenticity and quality of bio-based materials throughout the supply chain.
- Software Tools and Databases: Developed to support the analysis and decision-making processes related to material selection, building performance, and project management.

3. Demonstrative and Validation Tools:

- Real and Virtual Demonstration Sites: Employed to test and showcase the practical application of developed materials and technologies in real-life settings and simulated environments.
- Analytical Instruments and Testing Rigs: Used for characterizing the thermal, mechanical, and fire-retardant properties of insulation materials; instruments like Thermogravimetric Analysis (TGA), Fourier-Transform Infrared Spectroscopy (FTIR), and mechanical testing setups are crucial for this purpose.

Figures 3 and 4 are provided below as examples of developed BIO4EEB demo-site models.



Figure 3. 3D model of Lithuanian demo site



Figure 4. Extract of the 3D scan - French demo-site

3 Analysis of the Target Audience

The training program is specifically tailored for a diverse group of stakeholders, including designers and architects, building material manufacturers and testing facilities, contractors and construction companies, public and scientific community, and researchers. These participants have been chosen due to their pivotal roles in the construction industry and their ability to directly influence and facilitate the adoption of bio-based building technologies.

Utilizing insights from a comprehensive stakeholder analysis previously conducted under WP6 in *D6.6–Plan for dissemination and exploitation report*; under WP2 in *D2.3 – Socio-economic assessment and end users’ segmentation*; and under WP4 in *D4.1 - Demo-cases contextualisation report*; the training aims to equip these key groups with the knowledge and skills necessary to implement BIO4EEB solutions effectively. This prior analysis helps ensure that the content is highly relevant and directly addresses the specific needs and interests of each group.

3.1 Target audiences and key stakeholders

Based on D6.6, this section will expand upon the preliminary analysis of target groups by integrating insights from the detailed categorization of stakeholders identified in the original document. Here, the focus would be specifically on practitioners and SMEs within the construction sector, ensuring the training content and engagement strategies are directly applicable to their needs:

- **Designers and Architects:** For practitioners in design and architecture, BIO4EEB will demonstrate the practicality and environmental benefits of its products, enhancing their ability to incorporate sustainable materials in their projects.
- **Building Material Manufacturers & Testing Facilities:** BIO4EEB will work with SME manufacturers to foster the development and testing of bio-based building materials, highlighting their advantages in terms of performance and sustainability. This will support SMEs in adopting new materials that meet market needs and regulatory standards.
- **Contractors and Construction Companies:** The project will showcase how BIO4EEB innovations can be seamlessly integrated into current construction practices, emphasizing the operational and cost benefits for SMEs in the sector.
- **Scientific Community and Researchers:** Engaging with this group will be focused on collaborations that enable continuous improvement and innovation within SMEs practices. BIO4EEB will share insights on the sustainability indicators of construction products, facilitating research collaborations that can lead to advanced solutions suitable for SMEs adoption.
- **Public, Community, and Civic Society:** Although not the primary focus, engaging with the broader community will help practitioners and SMEs understand the societal demand and support for sustainable construction practices. BIO4EEB will highlight the long-term safety, affordability, and energy efficiency benefits of bio-based building materials.

3.2 Enhancing Stakeholder Engagement through Targeted Strategies

Steaming from insights from D6.6 and D4.1, this part will delve into understanding the motivations behind stakeholder actions and decisions, which is crucial for customizing engagement approaches. Stakeholders are

driven by a variety of factors including economic benefits, regulatory compliance, social impact, environmental awareness and technological advancements.

Targeted Engagement Strategies:

- **Regulatory Influencers:** BIO4EEB will emphasize the project's alignment with new environmental regulations and potential for setting industry standards.
- **Economic Actors:** BIO4EEB will focus on the economic analysis of adopting bio-based materials, showcasing cost benefits and long-term savings.
- **Community Advocates:** BIO4EEB will highlight the environmental and social improvements the project brings, enhancing community well-being and ecological sustainability.
- **Industry Innovators:** BIO4EEB will present opportunities for adopting cutting-edge technologies and developing new products that open additional market opportunities.

Specific Strategies:

- **Designers and Architects:** BIO4EEB will focus on the integration and benefits of bio-based building materials within sustainable architectural designs.
- **Building Material Manufacturers & Testing Facilities:** BIO4EEB will provide in-depth knowledge about production processes, quality control, life cycle impacts of each developed solution and compliance with sustainability standards.
- **Contractors and Construction Companies:** BIO4EEB will show practical installation techniques and project management skills specific to bio-based building materials.

By aligning the stakeholder engagement strategies with detailed analysis of needs and training requirements, the project ensures that all parties are not only well-informed but also actively involved in promoting the adoption of sustainable building practices. This comprehensive approach guarantees that the training delivered is not only relevant but also practical, fostering a collaborative environment conducive to innovative and sustainable industry advancements.

4 Analysis of Training Needs

In D6.11, a significant component of the stakeholder engagement strategy revolves around targeting and educating distinct segments of the target audience, based on the detailed stakeholder analysis previously conducted under WP6. The training will thus be designed to meet the specific needs and bridge the knowledge gaps identified for various professional groups that are crucial in the application and advocacy of the BIO4EEB project's bio-based building innovations.

The focus is on equipping each group with tailored knowledge and skills that align with their professional roles and influence over the adoption of new technologies. Designers and Architects are provided with insights into the design integration of bio-based building materials, emphasizing the aesthetic and functional benefits. Material manufacturers are educated on production processes and quality control to enhance the standard and compliance of bio-based building materials. Construction entrepreneurs and workers receive training on practical installation techniques and site management to ensure effective implementation. Scientific

Community and Researchers delve into detailed scientific data and potential research areas to foster innovation within the sector.

This approach ensures that each stakeholder group is engaged effectively according to their capacity to influence and utilize BIO4EEB technologies, making the dissemination of the training, both strategic and impactful. The methods employed include feedback from pilot projects, consultations with experts, and adherence to industry standards, allowing the training to be dynamic and responsive to the needs and insights of the industry stakeholders. This ensures that the training is comprehensive, up-to-date, and directly beneficial for all participants, fostering a broad acceptance and successful integration of bio-based solutions in the market.

5 Scope Training Program and Modules

The training program developed for D6.11 of the BIO4EEB project is structured into distinct, modular segments, each focusing on specific tools and techniques that have been developed as part of the BIO4EEB solutions. The modular design of the training program ensures that each unit can stand alone, allowing participants the flexibility to select topics that are most relevant to their needs, while still maintaining a cohesive curriculum that builds a comprehensive understanding of bio-based building materials.

Each module is meticulously crafted to cover different aspects of the BIO4EEB technologies—from the basic properties and benefits of bio-based building materials to advanced installation techniques, compliance with environmental standards, and integration into existing legal and market frameworks. The delivery method for each module varies to best suit the content and target audience, incorporating a mix of lectures, workshops, and digital resources, such as interactive webinars and instructional videos. This approach ensures that learning outcomes are maximized, providing participants with a practical understanding of how to apply these innovative solutions within their own work environments, thus promoting the effective and widespread adoption of bio-based building solutions.

The training will be delivered through a combination of in-room and web-based formats to accommodate a broader audience and ensure interactive participation.

Training modules:

a) **Module A: Introduction to BIO4EEB and Sustainable Building Materials**

Objective: Introduce the BIO4EEB project, its goals, and the importance of bio-based building materials in sustainable construction.

Material Proposed:

- PowerPoint presentations providing an overview of the BIO4EEB project and the main trends on bio-based building materials in the EU.

b) **Module B: Legislative Framework**

Objective: Educate participants on the international legislative and regulatory frameworks that govern the use of bio-based building materials in the construction industry, specifically focusing on the directives and initiatives related to the BIO4EEB project. This module aims to ensure participants understand how to

navigate and comply with these regulations, thereby promoting sustainable construction practices and contributing to the EU's energy efficiency and environmental goals.

Specific sessions:

- **European Green Deal and the Renovation Wave:**

The European Green Deal outlines the EU's strategy to become climate-neutral by 2050, which includes the Renovation Wave initiative aimed at doubling the annual renovation rate of buildings in the next ten years. BIO4EEB aligns with the Renovation Wave by developing innovative bio-based building materials and renovation practices that improve energy efficiency and support circular economy principles.

- **Energy Performance of Buildings Directive (EPBD) (2010/31/EU, revised in 2024):**

The EPBD aims to improve the energy performance of buildings within the EU, requiring Member states to establish energy performance standards for buildings and promote the use of energy-efficient building technologies. BIO4EEB supports this directive by developing bio-based building materials that enhance building energy performance, targeting net zero energy standards and significant energy savings.

- **Energy Efficiency Directive (EED) (revised in 2023):**

The EED sets measures to enhance energy efficiency across the EU, including requirements for energy savings and energy-efficient renovations. BIO4EEB contributes to the EED goals by promoting deep renovations and the use of advanced bio-based materials to reduce energy consumption and CO2 emissions in buildings.

- **Circular Economy Action Plan (CEAP):**

The CEAP promotes sustainable practices across various industries, including construction, by encouraging the use of recyclable and reusable materials. BIO4EEB integrates circular economy principles by developing bio-based prefabricated components that are reusable and have a lower embodied carbon footprint, thus extending the lifecycle of buildings and reducing waste.

- **EU Taxonomy Regulation:**

This regulation establishes a classification system for environmentally sustainable economic activities, which includes criteria for sustainable building renovation. BIO4EEB aims to meet these criteria by ensuring that its bio-based building solutions contribute to energy efficiency, reduced emissions, and sustainable building practices.

Material Proposed:

- PowerPoint presentations providing an overview of the Legislative Framework.

c) Module C: Comprehensive Guide to Bio-Based Materials and BIO4EEB technology

Objective: Equip participants with an in-depth understanding of various bio-based building materials used in the construction industry, their environmental benefits, and practical knowledge of utilizing BIO4EEB tools and technologies for effective implementation of bio-based building solutions.

Material Proposed:

- Detailed PowerPoint presentations on the properties, benefits, and applications of various bio-based building materials.

- Recorded demonstrations of material applications and techniques.

Partners involved:

The materials for the training module C, will be developed collaboratively with participation of the partners responsible for the development of BIO4EEB solutions (listed in Section 3) under coordination of the Training task leader (EBC) and Dissemination and Communication work package leader (R2M FR). AIMPLAS will support Module C training material production by creating a PowerPoint presentation and also short-recorded videos to introduce bio-based building materials and BIO4EEB solutions. These short videos will showcase the development of various BIO4EEB solutions. Sophia will support to produce a recorded demonstration of BIO4EEB material application and techniques. These recordings will be produced in collaboration with partners responsible for the installation of Posidonia panels, as these are designed for facade components. Sophia will further support AIMPLAS in preparing the PowerPoint presentation. INDRESMAT will also contribute to producing showcase videos during bio-based material applications. Based on 3D drawings, GOYER could produce a presentation which will show the fabrication process of the façades. An installation process will also be implemented and could be shared as training support.

d) Module D: Practical Applications and Pilot Projects

Objective: Provide hands-on examples and experiences from BIO4EEB pilot sites, demonstrating the real-world application of bio-based building materials and technologies.

Material Proposed:

- PowerPoint presentations reviewing the challenges, solutions, and results obtained from pilot projects.
- Short videos that showcase of BIO4EEB pilot cases.

Partners involved:

Similar to module C, training module D materials will be developed collaboratively as well, with participation of the partners responsible for the development of BIO4EEB solutions (listed in Section 3) under coordination of the Training task leader (EBC) and Dissemination and Communication work package leader (R2M FR). AIMPLAS will support in creating short videos demonstrating the demo-case application of the products or visualise the small-scale application of the products. Sophia will support in producing short recordings that could showcase the practical application of their product, and record the process of the bio-panel installations at demo-sites in coordination with demo-leaders. INDRESMAT will also contribute in making the demo videos to demonstrate how the bio-product works in real demo site. Potentially informative posters could be designed for showcasing at the pilot sites. Implementing site installation of façades video should be possible with the support of GOYER and in collaboration with demo-case owners during the installation process.

A panel discussion with project managers and stakeholders involved in the pilot projects will also be proposed during this module.

6 Three physical information days

The three physical information days organized as part of the BIO4EEB project's Subtask 6.3.4 are meticulously planned to ensure effective dissemination of training materials and engagement with a wide range of

stakeholders across the European Union. These events are strategically located in various EU countries to tap into regions with a high concentration of construction activities and where there is a significant potential for adopting bio-based materials.

The European Builders Confederation (EBC) plays a key role in coordinating these events, ensuring consistency in messaging and presentation quality across different venues. After developing all the training materials EBC will announce where the three physical information days will be held.

The selection of locations is based on factors such as maximising the presence of the targeted stakeholders; regional commitments to sustainable building practices; and the potential to influence local building policies. The aim is to engage a diverse audience, including designers and architects, building material manufacturers and testing facilities, contractors and construction companies, public and scientific community, and researchers, with a particular focus on those who can impact decision-making processes and those directly involved in construction and material production.

Each information day is designed to showcase the practical applications and benefits of bio-based building materials through a variety of formats, including live demonstrations, interactive sessions, video material such as short explanatory YouTube videos, and the distribution of user-friendly materials as brochures, infographics, and detailed guidelines. These materials are intended to provide hands-on guidance and highlight the effectiveness and application techniques of bio-based building materials in real-world scenarios.

Feedback mechanisms are an integral part of each event, allowing for the collection of valuable insights from participants about the concepts, training materials and their applicability. This feedback is essential for refining future training modules and enhancing the overall effectiveness of the dissemination strategy. Following each event, there is a concerted effort to maintain engagement with attendees through follow-up communications, additional resource distribution, and further training opportunities. This ongoing engagement helps to foster a community of practice around the use of bio-based building materials in construction, building networks, and encouraging collaboration across the industry.

The impact and effectiveness of each information day will be thoroughly documented and evaluated. These evaluations are crucial for assessing how well the training materials are received and whether the training effectively communicates its intended messages. The outcomes not only help in planning future events but are also used to report back to the European Commission on the progress and impact of the project, ensuring continuous improvement and adaptation of the training approach to meet the evolving needs of the construction industry in Europe.

7 The Digital BIO4EEB Platform and Its Utilization in Training

The Digital BIO4EEB Platform is an advanced digital tool designed to enhance the adoption and application of bio-based building products, in alignment with the EU's decarbonization goals. It serves as a comprehensive resource for the various stakeholders involved in the BIO4EEB project, including designers, architects, construction entrepreneurs, material manufacturers and researchers.

Features of the Platform:

- **Resource Repository:** The platform acts as a central hub for detailed information on bio-based products, offering functionalities such as product comparisons and selection guidance based on performance criteria and sustainability metrics.
- **Interactive Tools:** Features interactive tools for scenario simulation, which help users visualize the implications of their choices in terms of energy efficiency and environmental impact.
- **User-Friendly Interface:** Designed to be accessible for all user groups, ensuring that even stakeholders with limited technical skills can benefit from the resources available.

Utilization in Training:

- **Training Resource:** The platform can be used as a key resource in training sessions, providing users with hands-on experience in selecting and applying the right bio-based building materials for different construction scenarios.
- **Enhanced Learning Experience:** Interactive tools and a comprehensive resource repository make it easier to explain complex concepts and demonstrate the benefits of bio-based materials in a tangible way.
- **Feedback and Adaptation:** It allows for real-time feedback during training sessions, which can be used to adapt the training content to better meet the learners' needs.

The Digital BIO4EEB Platform plays a crucial role in connecting the sustainability and digital transition expected from the construction sector. This platform supports the project's goals by facilitating better decision-making in material selection, which directly enhances the energy performance of buildings using bio-based building materials. Additionally, it acts as a bridge between different stakeholders, promoting an understanding of the practical and environmental advantages of bio-based building materials. This integration fosters cohesive stakeholder engagement and ensures alignment with the project's sustainability objectives.

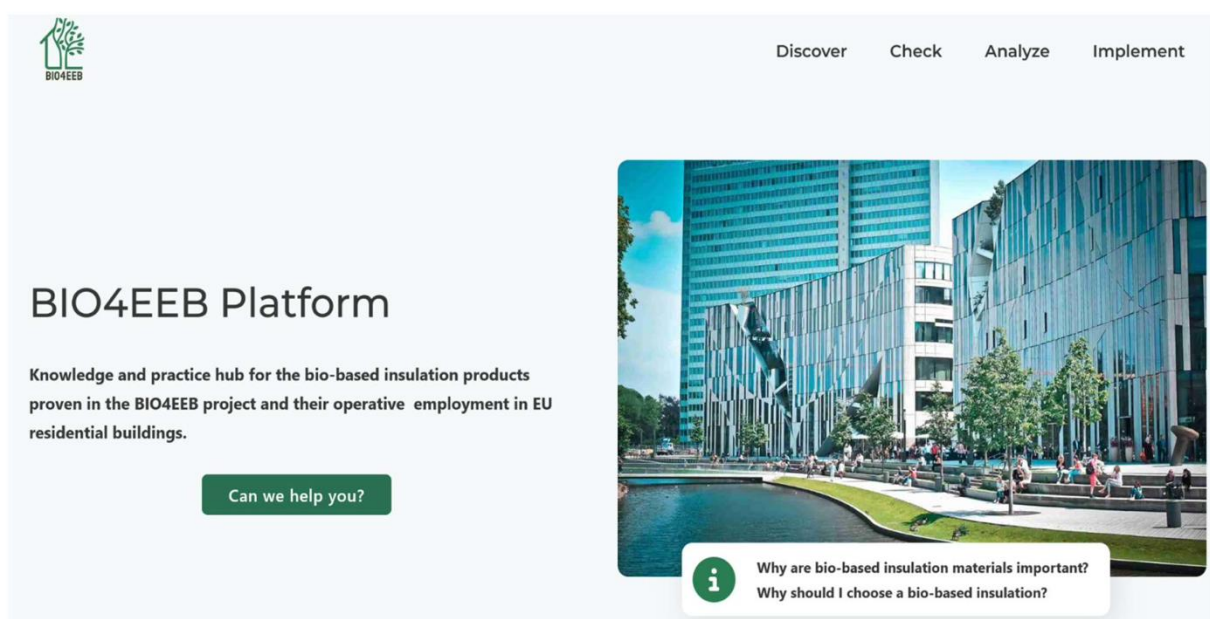


Figure 5. BIO4EEB platform landing page

8 Conclusions

The comprehensive training program developed under this project is tailored to equip a diverse group of stakeholders—including designers and architects, building material manufacturers and testing facilities, contractors and construction companies, public and scientific community, and researchers—with the necessary knowledge and tools to effectively implement these sustainable solutions.

The project's emphasis on bio-based materials addresses the critical need for sustainable building practices amidst series of energy crisis and material shortages. By fostering a deeper understanding of the properties, benefits, and application techniques of bio-based building materials, the training modules aim to facilitate their adoption and compliance with environmental standards, while pushing for a more circular approach in construction.

Additionally, the Digital BIO4EEB Platform serves as a cornerstone of the project, offering an advanced, user-friendly tool to support stakeholders in material selection, performance simulation, and energy efficiency calculations. This platform enhances the training experience by providing interactive resources and real-time feedback, ensuring that participants can apply the knowledge in practical scenarios.

At present, the training modules are still to be defined properly. The detailed development of these modules will be completed in the next two deliverables. To ensure the modules meet the highest standards and address all relevant aspects, we will seek feedback from other partners involved in the project. The ongoing development and refinement of the training modules, with input from project partners, will ensure that the program remains relevant, comprehensive, and effective in achieving its goals.

Looking forward, the continuous evaluation and feedback mechanisms embedded in the training program will allow for ongoing improvements, ensuring that the content remains relevant and up to date with the latest advancements in bio-based building technologies.



References

- [1] Dunphy Niall P., Morrissey John E., & MacSweeney Rosemarie D. (2014). Analysis of Stakeholder Interaction within the Building Energy Efficiency Market.

