

POLICY BRIEF 1 | March 2024

Promoting a practical and vocational interdisciplinary Bioeconomy education in farming framework for the EU

What is the challenge?

The EU **agricultural sector** faces key challenges such as climate change and its dependence on non-renewable resources. It is currently largely dependent on unsustainable practices and non-renewable materials. Over the past decade, the agricultural sector has made significant progress towards a more **sustainable** and **circular way** of doing business, without comprising the Union's food security. To be more specific, sectoral greenhouse gas emissions and pesticide usage have decreased while organic farming has increased both in terms of arable land as well as market value. However, there is significant room for improvement regarding climate mitigation and adaptation (e.g. water scarcity).

It is clear on a **policy level** that for the EU to reach its sustainability goals for 2030 and 2050 a **transformation is needed in the sector**. The EU's goals are to ensure food security and reduce the environmental impact of agriculture.

Those goals can be achieved through a **comprehensive circular bio-economy plan implemented in a strong synergy with an educational framework, based on bioeconomy principles**. Which should become available for agricultural stakeholders that allows them to address the complexity of modern challenges and provides practical and interdisciplinary education opportunities.

The workforce requires assistance in regard to integrating bio-economy business models within the agricultural ecosystems. Relevant training, that integrates bioeconomy principles, is largely non-existent in most EU countries, as shown in Figure 1, as well as qualified individuals that could potentially bridge the gap between higher and/or vocational education and farmers. Experts with different backgrounds (e.g. agriculture, life cycle analysis, water and waste management etc.) and local stakeholders (farmers, entrepreneurs, processing business owners etc.) should get together to boost research and innovation and share common practices.

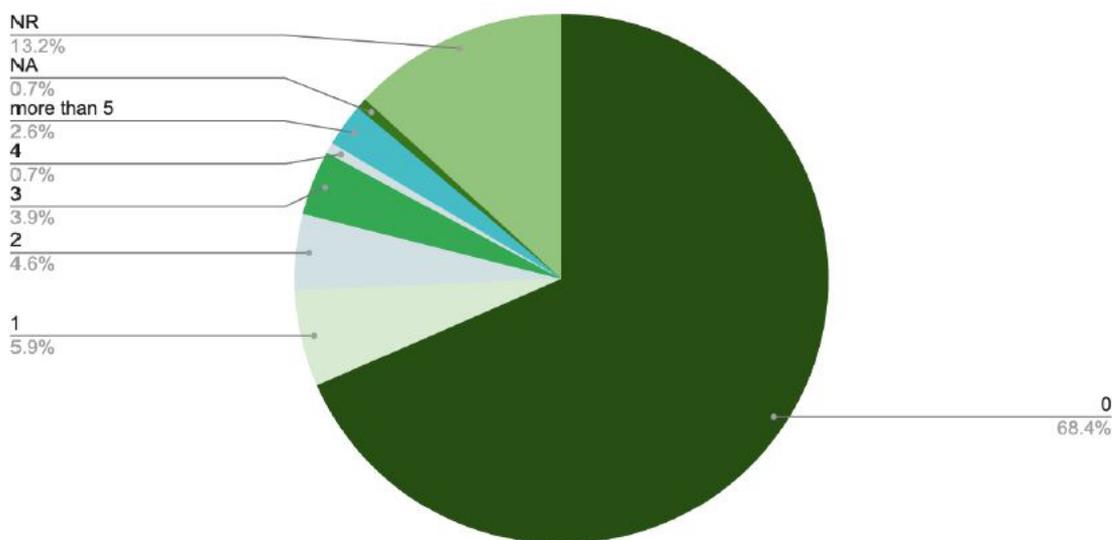


Figure 1: Number of curricular units/disciplines related to bioeconomy during the latest degree/qualification/course (%) in 13 EU countries. Source: TERINOV: Analysis of training in Bioeconomy in farming sector.

The **RELIEF project** (EuRopean Bio-Economy AlliancE In Farming) aims to bridge the gap by bringing together the aforementioned stakeholders as well as university students, researchers, agriculture cooperatives etc. Higher education (HE) and vocational training can play a critical role in this transition by integrating dedicated curricula and coaching. The **training needs analysis** carried out by the RELIEF project supports this and highlights certain key gaps while recognising region specific parameters.

In recent years, several bioeconomy education courses have emerged, but our research and analysis shows that these are largely focused on higher education courses which can be broadly categorised according to the criteria presented in Table 1.

Type of Program	Description	Typical Learning Method	Time Period (Years)	Geographical Locations	Prevalence	Qualifications
General Bioeconomy Bachelor	Theory-based learning with some practical elements.	lecture/classroom based, e-courses and virtual learning, participatory learning, some practical elements/on site demonstration	3-4	Germany [37], Finland [51], Norway [32], Poland [39]	Several	Undergraduate degrees
Bachelor on specific bioeconomy themes	Mixed learning approach	lecture/classroom based, e-courses and virtual learning, participatory learning, many practical elements/on site demonstrations	3-4	Germany [33,34], Spain [40], Finland [36], UK [35]	Several	Undergraduate degrees
Masters	Mixed learning approach	lecture/classroom based, e-courses and virtual learning, participatory learning, many practical elements/on site demonstrations	1-2	Greece [38,41], UK [42], Austria, Ireland, France [31], Germany [43], Netherlands [44], Italy [45], Sweden [46]	Many	Postgraduate certificates and degrees
PhD, Post-doc	Research oriented	Self-learning, some lecture/classroom based	2+	Ireland [49], Switzerland, Spain, Italy, Sweden, Netherlands, Germany, Austria, Belgium [48], France [50]	Several	Degree

Table 1: Current higher education practices for the bioeconomy (Source: TERINOV: Analysis of training in Bioeconomy in farming sector).

Our research indicates that there is a need for more practical and vocational courses, given that less than 2% of identified bioeconomy education programs were bioeconomy related Vocational Education Training (VET) programs, as illustrated in Figure 2. A significant **challenge with practical and VET approaches in farming** in the EU is the **lack of uniformity and standardisation across member states.** The agricultural sector is diverse, with varying practices, technologies, and agroecological conditions in different regions of the EU. As a result, VET programs for farming across the EU lack consistency in curriculum, training methodologies, and accreditation standards.

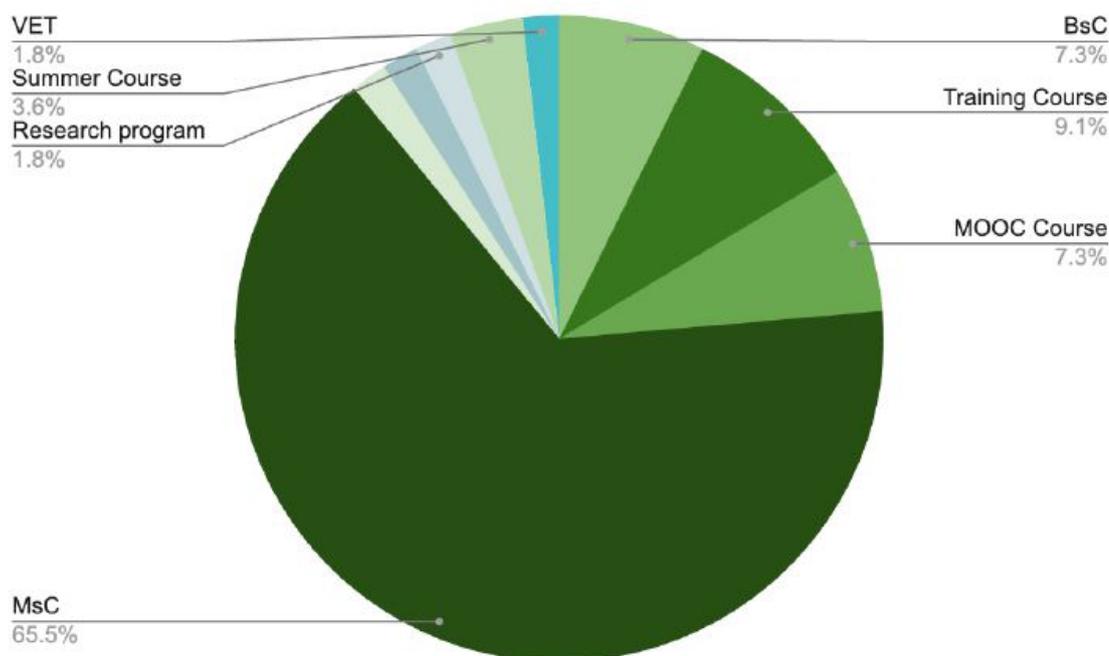


Figure 2: Distribution of education and training programs by type of course (%) in 13 EU countries. Source: TERINOV: Analysis of training in Bioeconomy in farming sector.

Generally, interdisciplinary aspects are lacking from practical education and VET programs within the agricultural sector, while **it is clear that interdisciplinary programs are needed to deal with the multifaceted challenges associated with achieving sustainable transformations in agriculture.** The intricate nature of contemporary agricultural issues demands a more holistic approach, one that integrates knowledge and expertise from various disciplines. **By doing so, these programs can better equip agricultural stakeholders with the diverse skill set required to navigate and address the complexities inherent in fostering sustainable practices within the sector.** As an indication on how such a program could be developed and implemented, **the RELIEF curriculum** has been developed by experts and based on the recommendations from the **“Analysis of Training in Bioeconomy in farming sector.”** The courses developed are interdisciplinary, cover key topics in agriculture and place the learner at the centre of the learning process with a focus on acquiring practical skills by combining face to face, work based, and online learning techniques for both HE and VET. The consortium proposes several policy recommendations for HEIs, VET providers and policy makers.

Policy Recommendations

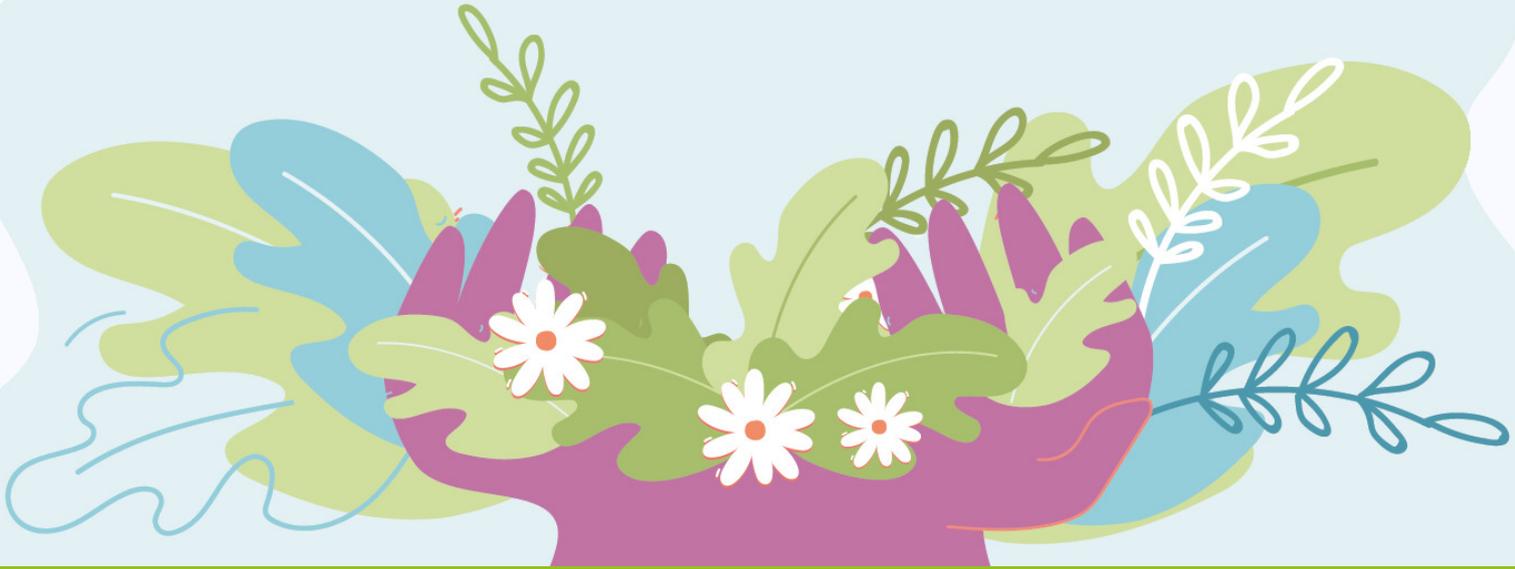
- Create a comprehensive and accurate database for bioeconomy HE and VET programs in EU agriculture.
- Develop and make available to the public demonstration sites as ‘best practice’ examples/showcases for a variety of sustainable agricultural technologies and practices.
- Develop specific guidelines on integrating bioeconomy aspects into existing VET programs in agriculture (especially for EQF4 and EQF5 programs curricula).
- Support the development of new practical and VET programs in agriculture that integrate bioeconomy aspects.
- Support the development of close links between education and advisory/extension services on a national level.
- Create logical and linear education and training pathways, promoting coordination between the VET sector and higher education institutions.
- Support individualised learning by developing new bioeconomy learning paths, modules, learning nuggets, and micro-credentials for certification, including on entrepreneurship.
- Use varied teaching methods to develop skills, including problem- and practice-oriented teaching and learning.
- Boost high-quality bioeconomy training, including ‘train the trainer’ and ensuring the provision of up-to-date training materials and modules.
- Replicate national best practices on an EU level where educational programs have direct links with businesses (Bioeconomy apprentices, advisory services).
- Bring up to speed EU member states with little progress made, share lessons learned and methods to overcome bottlenecks.
- Spread the word among bioeconomy stakeholders (farmers, equipment/fertiliser suppliers, processing businesses etc.) through farmers associations, word of mouth etc. and highlight the practical application of VETs in the field.
- Introduce the concept of circularity in bioeconomy training to further strengthen the bonds within the agricultural ecosystem and help reduce the reliance on finite resources.

Expected Impact

- Increased stakeholder participation in VET programs through consolidation in a single easy to use platform and repository.
- Increased adoption of sustainable and bioeconomy-based agricultural practices, reducing dependency on unsustainable methods and non-renewable materials.
- Enhanced biodiversity and soil health through sustainable farming to preserve the ecosystem for generations to come.
- Contribution to the achievement of EU sustainability goals for 2030 and 2050 by facilitating a transformative approach in the agricultural sector.
- Introduce farmers to the concepts of energy efficiency and waste management to help reach the goals set as part of the European Green Deal.
- Increased rural resilience with more agricultural stakeholders equipped with practical and interdisciplinary education, enabling them to address complex modern challenges in the sector.
- Reduction in identified gaps and training needs for agricultural stakeholders, with increased focus on practical and vocational courses in bioeconomy education.
- Enhanced knowledge and skills available thereby ensuring the competitiveness of the EU agricultural sector.
- Increased cooperation in rural areas to create innovative products with high added value, increased farm incomes and contributing towards the growth of the agricultural sector in the EU.
- Increased employment by bridging the gap between the HE and VET level due to the rising demand for intermediate-level experts.
- Increased recognition of small farmers by promoting their success stories and innovations partly achieved through their participation in the VET programs.
- Improved alignment with regulations, policies and financing tools by keeping relevant stakeholders up to date at EU, national or local level.
- Improved resource management and therefore increased food security within the Union.



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