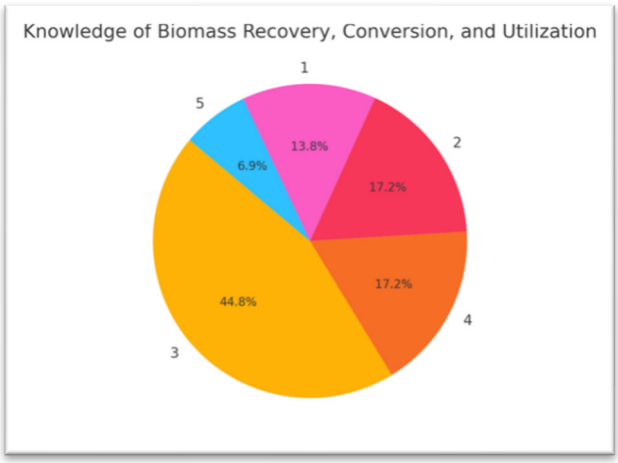
Biochar and Circular Carbon Economy Competences

The B4C Online Survey Report



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Introduction

Purpose of the Survey

The B4C survey was conducted to gather insights into the perceptions, knowledge, and challenges faced by educators in incorporating biochar and carbon-based circular economy concepts into vocational education and training. As global interest in sustainable development intensifies, integrating topics such as biochar and circular economy into educational frameworks becomes increasingly important. This survey aims to understand the extent to which these themes are recognized, valued, and potentially included in educational curricula, with a specific focus on vocational education.

This document has been drafted by FOLKUNIVERSITETET (SE), with and for the B4C Consortium, which comprises the following organisations:

1. BLENDED LEARNING INSTITUTIONS COOPERATIVE – DE
2. DEULA-Nienburg GmbH – DE
3. INSTITUT DE FORMATION SECTORIEL DU BATIMENT SA – LU
4. ASTREDHOR – FR
5. FOLKUNIVERSITETET (SE)

Survey Context

Biochar—a stable, carbon-rich material derived from biomass waste—is a versatile material for learning and developing projects in diverse VET fields. It promotes soil health, contributes to sequestering carbon dioxide (CO2), and promotes to sustainable resource use.

This it is integral part of the carbon-based circular economy, where materials, especially organic waste, are continuously reused and recycled, thus forming a “closed-loop” system that minimizes waste and environmental impact. As countries strive to meet climate goals and improve resource efficiency, the role of biochar and circular economy education in fostering the necessary skills and knowledge among students has gained attention.

The concept of a circular economy aligns well with the goals of education for sustainable development (ESD), which aims to equip learners with the understanding, values, and skills necessary to address interconnected global issues like climate change, resource depletion, and inequality. By focusing on vocational education, which trains students in practical, industry-relevant skills, this survey explores how educators can help bridge the gap between sustainability theory and practice, particularly through the inclusion of biochar and circular economy topics.

Participants Overview

The survey gathered responses from educators across vocational education sectors, encompassing various disciplines such as agriculture, construction, and engineering. Participants were asked to provide their general information, including age, gender, country, and position within their institutions. This demographic data helps in identifying potential

patterns and variations in responses based on background, professional roles, and geographic location.
Respondents also answered questions designed to capture their familiarity with sustainable development and circular economy concepts, their ability and willingness to integrate these themes into their courses, and the perceived level of student interest. Additional questions focused on existing curricular and logistical challenges, such as time constraints, access to materials, and the availability of suitable learning formats.
Through this survey, we aim to identify both the opportunities and barriers educators face in bringing biochar and the carbon-based circular economy into the classroom. Understanding these factors can help inform the development of resources, training, and support systems tailored to educators' needs, ultimately enhancing the relevance and effectiveness of vocational education in addressing sustainability challenges.

General Information of Participants

Demographics

The survey included responses from educators across various vocational education and training (VET) fields, primarily from European countries. Respondents provided their age, gender, country, and institution, reflecting a diverse background in terms of demographics and professional settings. The ages ranged from mid-20s to late-50s, highlighting perspectives from educators at different career stages. Most respondents identified as either male or female, with a small percentage preferring not to disclose their gender.

Geographic and Institutional Representation

Educators from **20 European countries** participated in the survey, representing a broad geographic scope. Countries included Croatia, Italy, France, Slovenia, Belgium, Poland, Greece, Netherlands, Germany, Estonia, Spain, Sweden, Lithuania, and Bulgaria, among others. This diversity provides a comprehensive view of how biochar and the circular economy might be integrated across different educational and cultural contexts within Europe. In total, **125 responses** were collected, with participants coming from various institutions, such as universities, vocational training centres, and specialized institutes.

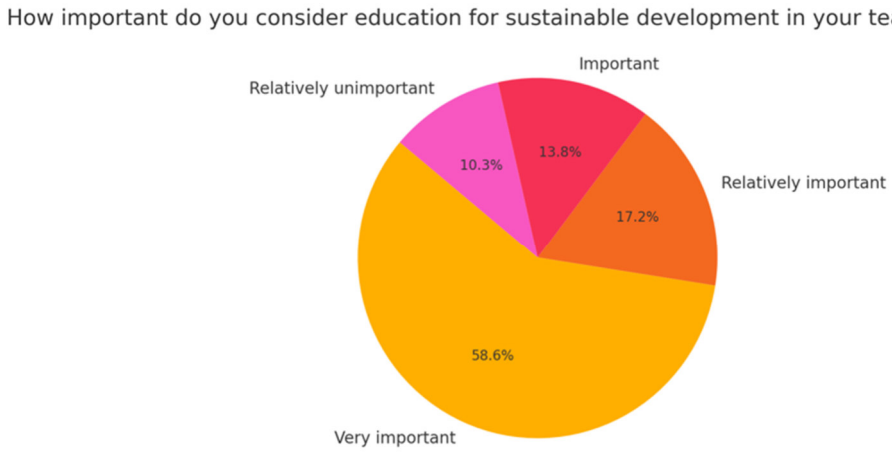
Professional Roles and Fields of Work

Participants held a variety of roles, including professors, senior lecturers, researchers, and administrators, with expertise in fields such as agriculture, environmental science, construction, and engineering. These positions allowed for varied perspectives on the current status and potential for incorporating biochar and circular economy topics into VET programmes. Notably, the majority of educators worked within the agricultural and environmental sectors, where knowledge of biochar and sustainability practices is particularly relevant.

Areas of Teaching and Key Subjects

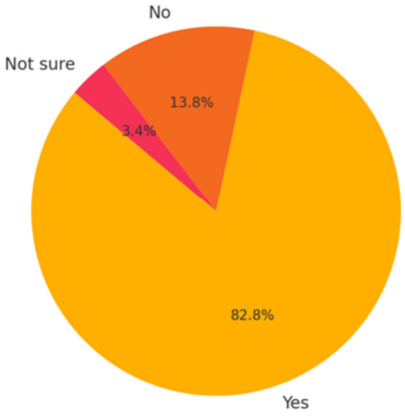
The survey also captured the subjects taught by participants, which spanned practical disciplines such as agricultural economics, technology, business administration, and specific vocational skills in construction and horticulture. This diversity in teaching areas indicates a broad relevance of biochar and circular economy topics across various facets of vocational education.
This section provides a foundation for understanding the demographic and professional context of the survey responses, offering insight into how biochar and circular economy education might be perceived and integrated within the existing VET landscape.

Perceptions on Sustainable Development and the Circular Economy



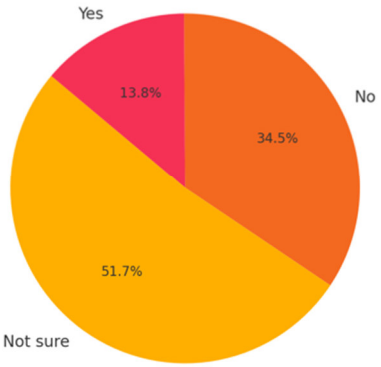
The data shows a high level of importance placed on sustainable development education among educators. The majority view it as essential to preparing students for future challenges, demonstrating a collective awareness of sustainability's relevance across various educational fields. This commitment suggests that educators are actively engaging in fostering environmental responsibility and resilience in their students.

Do you consider carbon-based circular economy approaches as part of sustainable development?



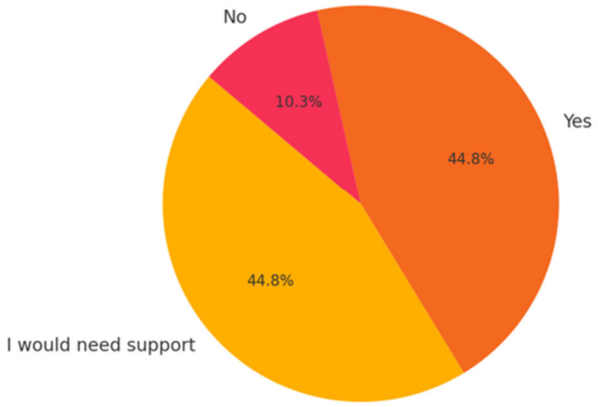
The overwhelming agreement (83%) suggests that educators widely recognize the value of the carbon-based circular economy within the broader framework of sustainable development. This perspective aligns with the goals of sustainability by encouraging resource reuse, waste reduction, and carbon management. Educators' strong support for integrating circular economy concepts indicates a readiness to prepare students for sustainable practices in various industries.

Are there specific learning programmes that teach about the carbon-based circular economy at your institution?



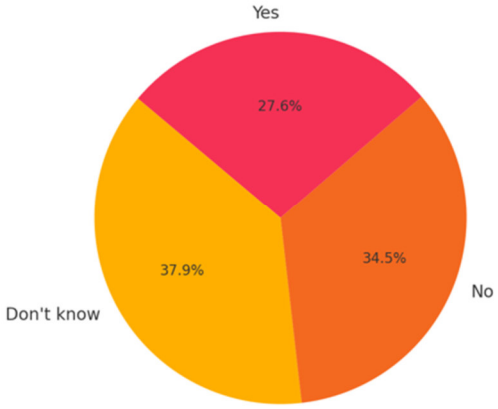
A high proportion of educators are unsure about the presence of such programmemes which suggests a need for clearer communication or documentation of available resources within institutions. This gap presents an opportunity for institutions to establish or enhance dedicated programmes focused on the carbon-based circular economy to strengthen their sustainability education offerings.

Could you incorporate content from the carbon-based circular economy into your courses?

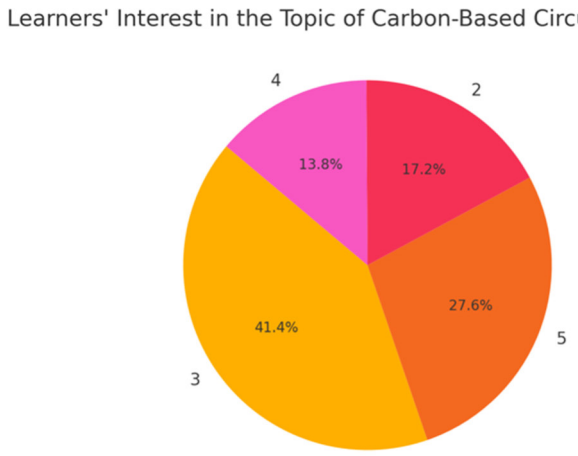


While nearly half of educators are ready to incorporate carbon-based circular economy content, a significant portion requires support to feel equipped for this integration. This finding underscores a need for accessible resources or professional development initiatives to assist educators in introducing these topics effectively.

Are learning and teaching opportunities on carbon-based circular economy available in your organisation?



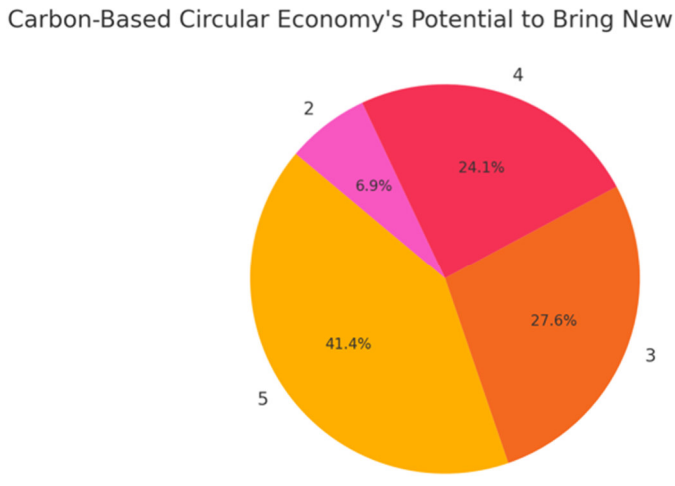
A substantial portion of educators is either unaware or lacks access to learning and teaching opportunities related to the carbon-based circular economy. Hence, institutions could benefit from increasing the visibility of these opportunities or creating new ones. By doing so, educators would be better positioned to engage students in sustainability practices through accessible and relevant materials.



Answers range from "1" strongly disagree to "5" strongly agree

While there is a moderate level of interest among learners in carbon-based circular economy topics, interest levels vary widely. A significant percentage of educators observe high enthusiasm, while others report limited interest. This variability may reflect differences in students' familiarity with the topic or its perceived relevance to their fields. To build engagement, educators might consider introducing more accessible resources or interactive learning experiences to enhance student interest in sustainability topics.

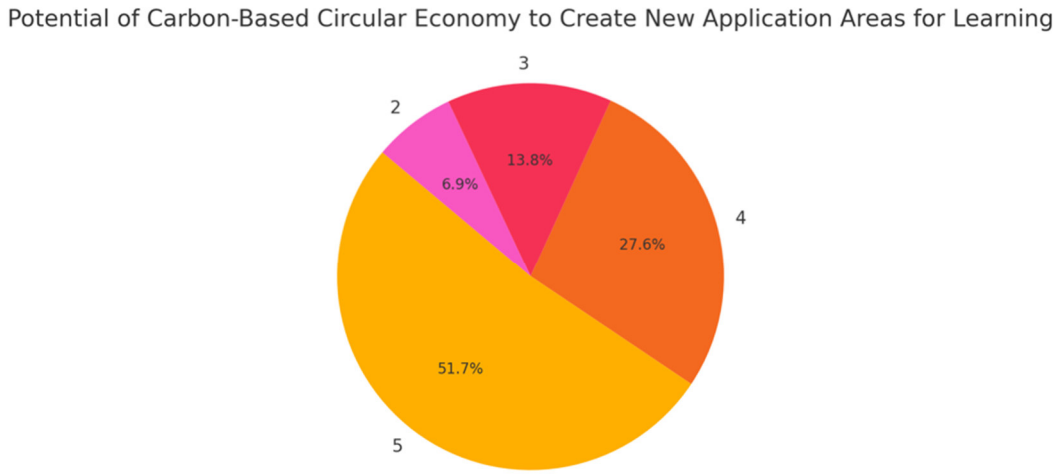
Opportunities for integrating the carbon-based circular economy in learning programmes



Answers range from "1" strongly disagree to "5" strongly agree

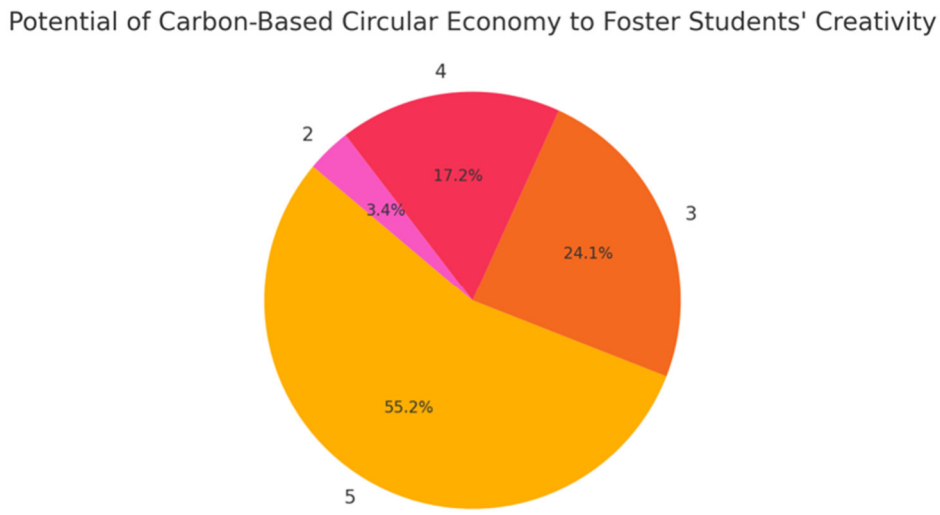
The vast majority of educators see the carbon-based circular economy as a valuable addition for introducing innovative topics into the curriculum. This support indicates an enthusiasm for

expanding course content to include cutting-edge concepts that align with current sustainability practices, suggesting educators' openness to diversifying educational content to reflect emerging industry trends.



Answers range from "1" strongly disagree to "5" strongly agree

Educators widely recognize the carbon-based circular economy's potential to extend learning applications. This enthusiasm highlights the versatility of the topic, which educators believe can be applied across various subject areas and practical scenarios, making it a beneficial addition to interdisciplinary education.

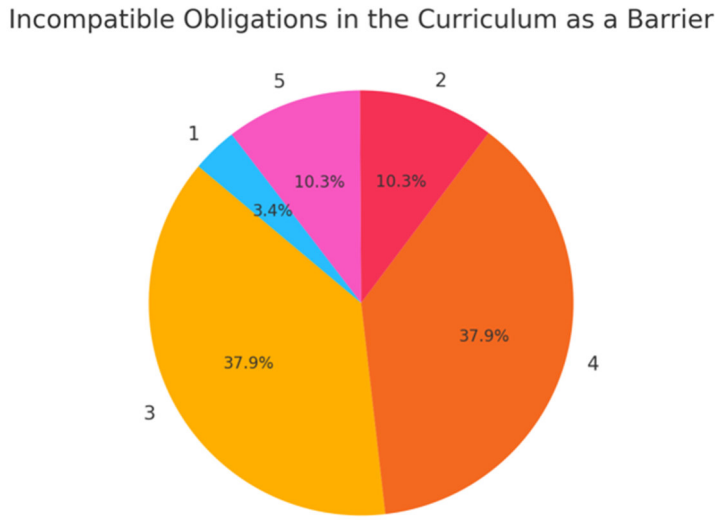


Answers range from "1" strongly disagree to "5" strongly agree

A large majority of educators see the carbon-based circular economy as a catalyst for creativity in the classroom. The strong support reflects educators' belief that sustainability topics, particularly those with practical applications like the circular economy, encourage students to think innovatively about environmental solutions and resource use. This perspective

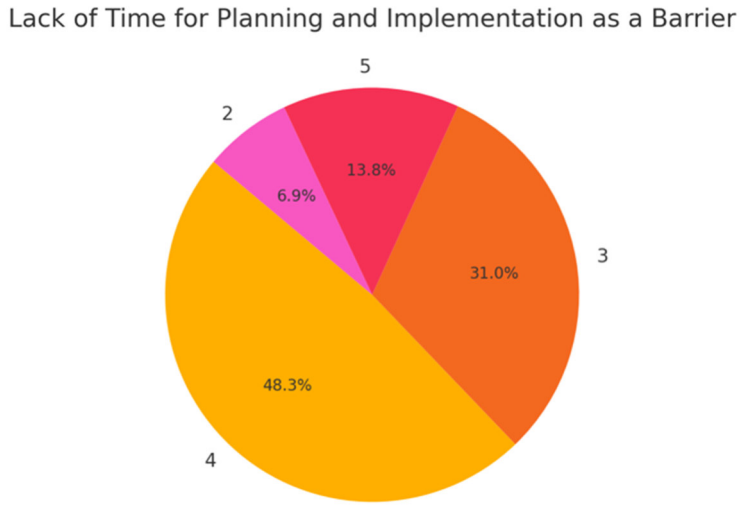
highlights the value educators place on teaching approaches that promote creative problem-solving skills in sustainability.

Barriers to the introduction of carbon-based circular economy topics in the classroom



Answers range from "1" strongly disagree to "5" strongly agree

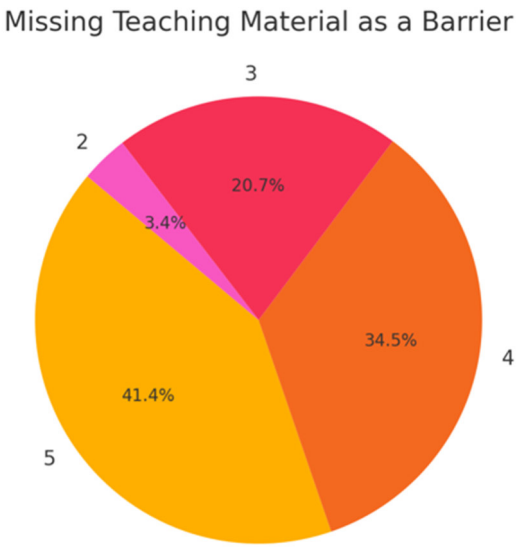
Many educators see existing curriculum obligations as a moderate to significant obstacle in integrating carbon-based circular economy topics. This suggests that curriculum inflexibility may hinder the inclusion of new content, signalling a need for curriculum adaptation to support sustainable education.



Answers range from "1" strongly disagree to "5" strongly agree

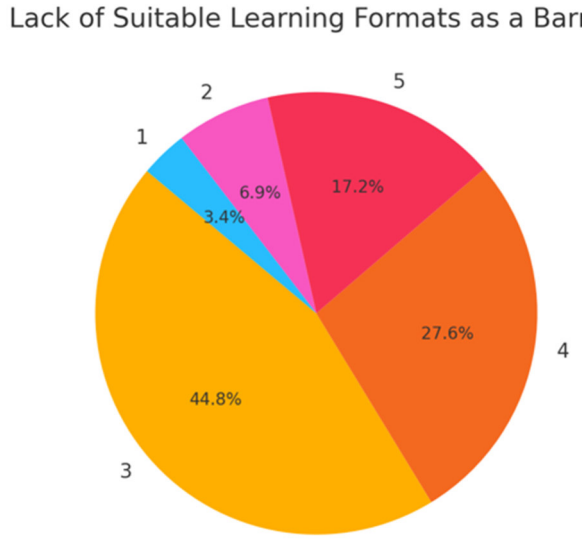
Educators frequently cite time constraints as a challenge to planning and implementing new content, with most seeing it as a considerable barrier (~89% agreement). This highlights the

need for supportive strategies that enable educators to incorporate sustainability topics without extensive additional time commitments.



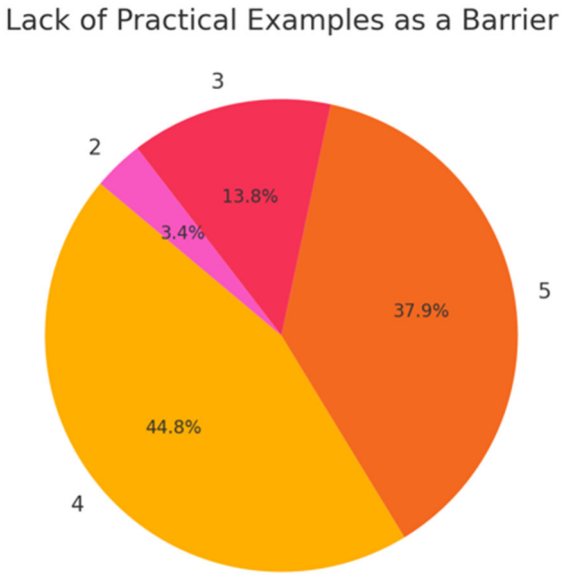
Answers range from "1" strongly disagree to "5" strongly agree

A lack of appropriate teaching materials is one of the most significant barriers educators face (~86% agreement). This underscores the importance of developing and providing accessible, high-quality resources that educators can use to teach carbon-based circular economy concepts effectively.



Answers range from "1" strongly disagree to "5" strongly agree

Still, 76% of the educators feel constrained by limited learning formats that support sustainability topics. Thus addressing this barrier could involve creating adaptable, varied formats, such as interactive or digital resources, to facilitate effective integration of the circular economy.

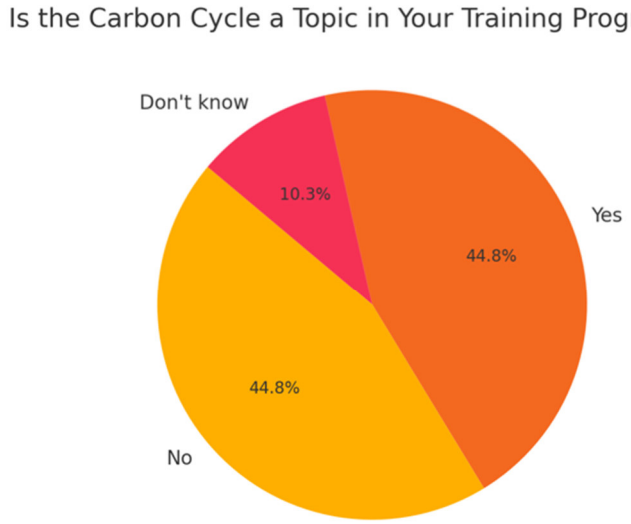


Answers range from "1" strongly disagree to "5" strongly agree

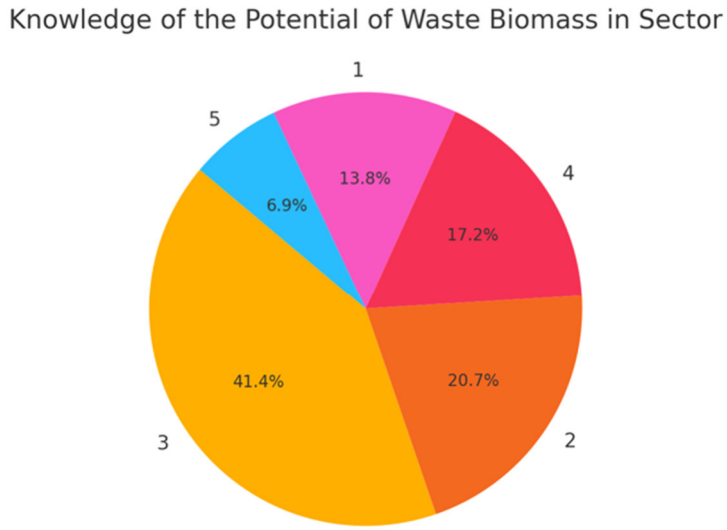
The absence of practical examples presents a major challenge in teaching the carbon-based circular economy (~82% agreement). Educators may benefit from case studies, industry partnerships, or example-driven resources that demonstrate real-life applications, helping students grasp these concepts more concretely.

For the question **"Do you have anything to add?"** following the barriers section, the responses were largely minimal, with participants typically responding with "No" or a similar brief answer. This suggests that educators did not have additional comments or specific insights beyond the structured questions provided in the survey.

The potential of biochar for “learning decarbonisation”

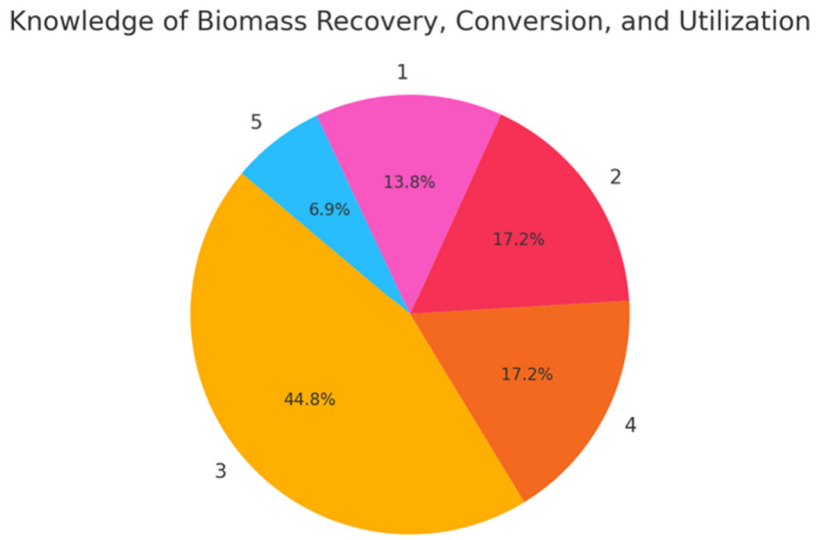


The mixed responses indicate that while some programmes address the carbon cycle, there is room for broader inclusion. Institutions may consider expanding carbon cycle topics within their curricula, especially given the importance of understanding carbon processes in decarbonisation efforts.



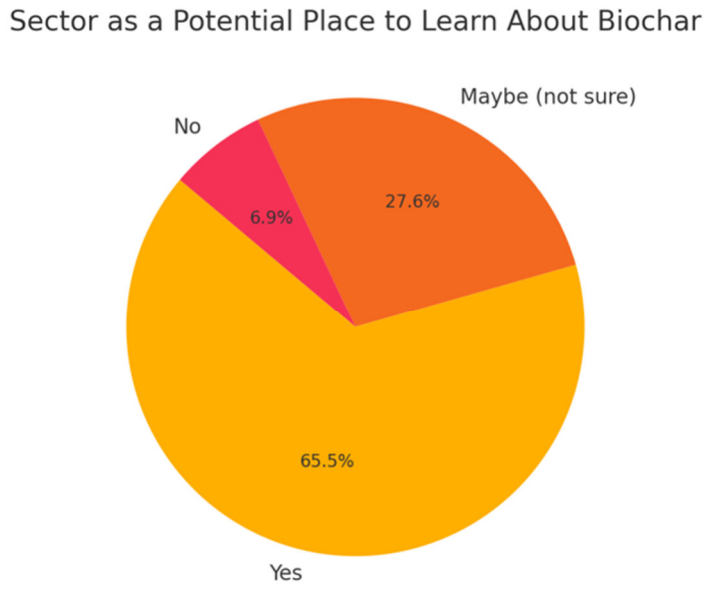
Answers range from "1" strongly disagree to "5" strongly agree

While some awareness exists, there is generally limited knowledge of waste biomass potential across sectors. Targeted resources or training on waste biomass applications could help bridge this knowledge gap and enable educators to better incorporate these concepts into their teaching.



Answers range from "1" strongly disagree to "5" strongly agree

Most educators feel they have a basic to moderate understanding of biomass utilization, indicating potential for further knowledge development. Focused workshops or informational resources could enhance educators' familiarity with these processes, equipping them to deliver more comprehensive instruction on biochar and biomass-related topics.



Many educators believe their sectors are well-positioned for biochar-related education (65%). This perspective supports the idea of using biochar as an accessible topic within existing programmes, particularly for sectors like agriculture and environmental science, where biochar applications are directly relevant.

Conclusion

The survey results highlight a strong interest among educators in integrating sustainable development topics, including biochar and the carbon-based circular economy, into vocational education. Educators recognize the importance of sustainability education for preparing students to address global challenges like climate change and resource management. While many view the carbon-based circular economy as a valuable addition to their curriculum, knowledge levels and familiarity with biochar's applications vary widely across sectors.

Key barriers identified include constraints within existing curricula, limited time for lesson planning, and a lack of accessible teaching materials. Additionally, while some educators report existing programmes on carbon-based circular economy topics in their institutions, many remain unaware of these resources, suggesting potential gaps in communication or accessibility.

The survey also revealed enthusiasm for the creative and innovative learning opportunities that carbon-based circular economy topics could bring. Many educators believe that teaching these concepts could foster students' creativity and enhance problem-solving skills, underscoring the potential for biochar and circular economy education to enrich vocational training.

Overall, the findings reflect a readiness among educators to engage with biochar and circular economy topics, provided they have the necessary resources and support. This interest highlights the importance of continued efforts to address identified barriers and develop educational resources that enable vocational institutions to effectively incorporate sustainability into their programmes.