Learning Design

Deliverable 3.1

Co-funded by the European Union

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1 The B4C Learning Approach

The B4C competence framework was created to list and describe the competences needed to tackle challenges and tasks in relation to the introduction of biochar as integral part of the Circular Carbon Economy. As such it creates the foundation of the Continuing Professional Development (CPD) in Vocational Education & Training (iVET and cVET)

The stocktaking carried out in the early project phases revealed that there is a strong interest from the VET sector to develop new learning fields in ESD /Education for Sustainable Development) based on the CCE and biochar. In parallel it also mapped a large variety of different learners from professional and civic background who are interested to introduce biochar and the CCE in their domains and contexts.

As a consequence, the B4C project conceptualised learning approaches both for citizens and VET learners and facilitators which are based on the LEVEL5 approach which was developed by the blinc eG since 2010 and which has been applied in more than 50 projects with several thousands of learners.

The approach is specifically feasible in informal or non-formal learning contexts which are characterised by a lack of formal curricula or subject specific educational approaches like in school or higher education.

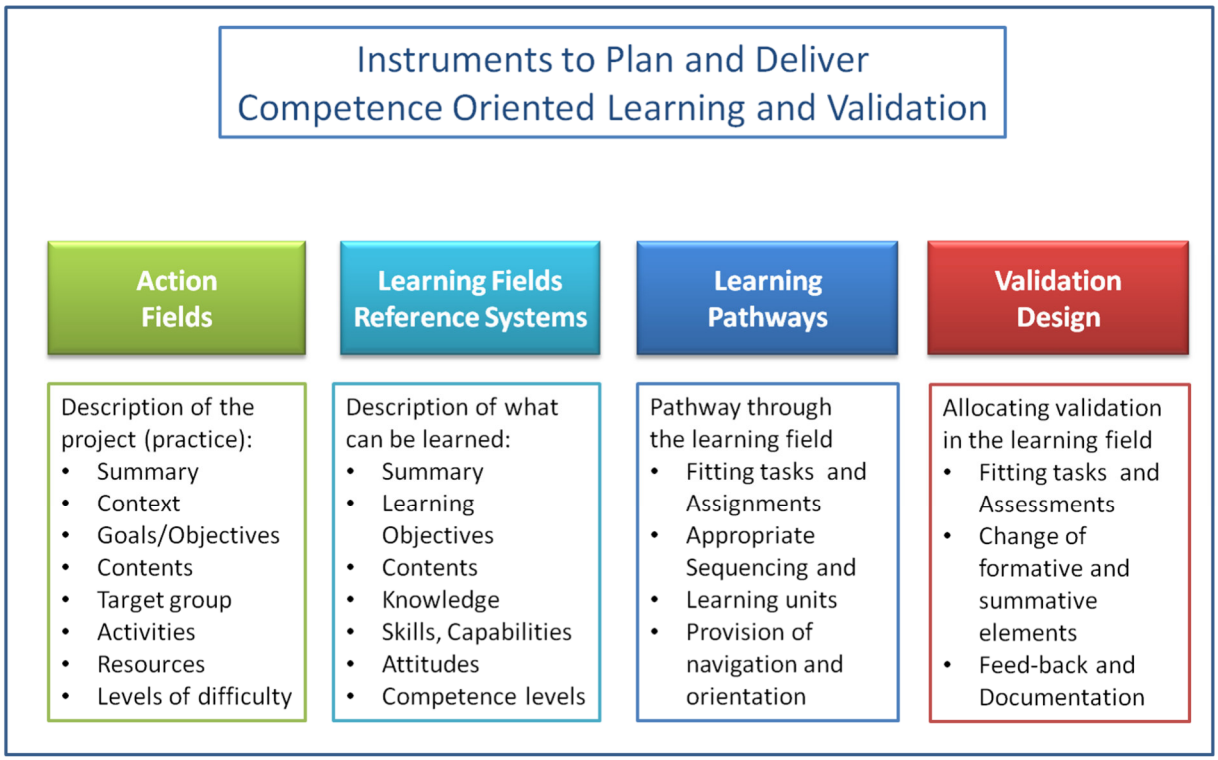
Those settings are typical for innovative learning projects, for instance in civic (sustainability) projects, entrepreneurial projects, joint development projects or extracurricular learning projects to introduce new action and learning fields to interested target groups.

The development of learning (in the sense of “didactics” as the art of teaching) is mainly determined by target group, learning contents, learning objectives and the available resources and methodologies.

The planning of reasonable learning projects, which may, for lay persons, seems to be a rather simple exercise, is in fact quite a challenge because of the interdependencies and differentiation in these categories, which require an iterative planning process, unlike the writing of a book, which is organised in a logical succession of chapters.

The LEVEL5 system was designed to enable also non-educational professionals to organise teaching and learning in a learner centred way which promotes constructive, effective and inspiring learning in real life contexts.

The LEVEL5 approach comes with a toolbox of 5 instruments which are applied to develop a Competence Oriented Learning (COL) approach, which substitutes a subject oriented learning approach and is ideal for the learning projects described above.



Starting with a didactic pattern which describes the basic educational components of the learning setting, it differentiates **action fields** (what learners should **do** in their contexts) and **learning fields** (what learners should **learn** in a specific learning project to develop the competences needed to work and act in the action field, be it professional or civic project contexts).

To outline the learning field, a LEVEL5 **reference system** is used. It is the central competence framework (described later in connection with the competence chapters). This reference system differentiates knowledge skills and attitudes on 5 competence levels.

The following "**Learning pathway**" is a tool, which assigns adequate tasks to the aspired competence levels and learning outcomes (expressed in knowledge skills and attitudes).

The last step is the **validation** of competences, namely the competence developments which the learners achieved during the learning process.

1.1. Didactic Framework

If we look at the biochar learning programme from a didactic framework perspective, we should firstly differentiate the target group(s), the contents, the main objectives, and the main methodology/ies and the resources.

Target Groups	Contents

- Professionals from different sectors (here: agri- und horticulture & construction)
- Volunteers (NGOs) and Citizens
- Project workers and local experts
- Teachers/Trainers
- Learning professionals
	- Biochar value chain
	  - Recovery
	  - Conversion
	  - Production
	  - Bioeconomic applications
	- Circular Carbon Economy
	- Design Thinking and Prototyping

Objectives	**Resources**
- Understanding and Knowledge creation on bio-char based CCE - Ability to develop new products in their do-mains - Participation in the product and value chain - Ability to calculate CO2 effects of products and projects - Motivation to extend the CCE learning and de-velopment projects	- B4C Blended Learning Approach - Online learning system - Practical projects (DBCL) - Hands-On exercises - Excursions - TechLab and centres - Mobility programme - European Network

Target groups

They are two main target groups: on the one hand learners (and professionals) in their vocational field AND on the other hand the facilitators who facilitate the acquisition of those competences.

Objectives

B4C aims at enriching and substantiating the rather general concept of “Education for Sustainable De-velopment (ESD)§ by focusing on the CCE and develop and exploit concrete applications of Biochar, e.g. for climate change mitigation and adaptation.

Contents

The contents releated to biochar and the CCE are mainly determined by to two aspects:

1. The context in which the learning programme is taking place (e.g. agriculture, horticulture or construction).
    a. a specific VET field (e.g. agriculture, horticulture, construction, etc.); and
    b. the context of a specific subject (e.g. physics, biology, chemistry, soil science, etc.).
    c. the context of a specific subject (e.g. physics, biology, chemistry or soil science).
2. The practical context within the biochar product and value chain. For instance:
    a. Biomass recovery (harvesting, pre-treatment, e.g. silaging or pelletising);
1. b) biomass conversion (pyrolysis) and post-treatment;
    b. Biochar product development, qualities of biochar and product classes
    c. Biochar in the bioeconomy (i.e. the circular carbon economy).

Main methodology/ies and the resources

To introduce the B4C CCE approach authentic learning experiences are needed which should be flexible and have to include practical learning projects in which the learners become “developers” of products and services. This way, by embedding biochar and other circular economy applications into concrete learning projects, citizens as well as students can bridge the gap between theoretical knowledge and practical skills to drive sustainable change.

1.2.Action Field(s)

The Action Field describes what learners should do in their working contexts.

In order to do that we have to describe and analyse the relations between target group, (action or work specific) objectives, contents and actions:

Target Groups:

1. Learners:
    a. Apprentices or students in vocational education and training
    b. Citizens - > citizen science
    c. Local and regional stakeholders who want to introduce, engage and participate in CCE projects
2. Professionals who might work with biochar (cVET)
    a. VET Teachers
    b. Researchers HE Professionals

Context:

1. Professionals who might work with biochar as new professional field
2. Apprentices or students in vocational studies who are interested in SD and CCE (iVET)
3. Citizens - > citizen science projects on SD and CCE
4. Local and regional stakeholders CCE Development projects

Goals/Objectives

1. Professionals who might work with biochar (cVET): Development
2. Apprentices or students in vocational studies (Learning, contributing, orientation)
3. Citizens - > (citizen science projects): Learning/collaborating
4. Local and regional stakeholders (CCE projects): Development

Contents

1. Biochar essentials
2. Recovery, conversion, treatments, applications, bioeconomy, CCE
3. Opportunities to develop products and projects
4. Professionals who might work with biochar (cVET): Development
5. Apprentices or students in vocational studies (Learning, contributing, orientation)

Activities

Working in the biomass to biochar-product value chain for:

1. Substrate developments for agri-/horticultural and construction purposes
2. Waste and water management and purification
3. Climate friendly building

1.3. Learning Field

The learning field describes what learners should learn in specific learning projects to develop the competences needed to work and act in the action field, be it professional or civic project contexts.

Action objectives are converted into learning objectives, which are expressed as desired learning outcomes relating to knowledge, skills, and attitudes:

Target Groups:

1. Learners:
   a. Apprentices or students in vocational studies
   b. Citizens - > citizen science
   c. Local and regional stakeholders who want to engage and participate in CCE projects
2. Professionals who might work with biochar (cVET)
   a. VET Teachers
   b. Researchers and/or HE Professionals

Objectives

- Citizens - > (citizen science projects): Learning/collaborating
- Local and regional stakeholders (CCE projects): Development
- Professionals who might work with biochar (cVET): Development
- Apprentices or students in vocational studies: Learning/collaborating

Knowledge

1. Biochar essentials
2. Recovery, conversion, treatments, applications, bioeconomy, CCE
3. CO2 certification
4. Project Development
5. Entrepreneurship

Skills relating to:

1. Substrate developments for agri- und horticultural purposes
2. Waste and water management and purification
3. Use it in the construction sector
4. develop products and projects

Attitudes

1. Openness for new applications and procedures based in biochar and CCE
2. Entrepreneurial mindset

2 Competence Oriented Learning in B4C

2.1. The Competence Framework

A competence is the ability to apply a synthesis of

- Knowledge,
- Skills and
- Attitudes

in a particular situation and in a particular quality.

The B4C competence framework is basically a four-field cluster with 18 competences which can be simplified and listed as follows:

Biochar and CCE competence inventory

Field Competences	Social Competences
• Circular Carbon Economy • Biochar specific competences • Entrepreneurial competences (Creating ideas and opportunities)	• Teamwork • Communication • Leadership • Client Orientation
Organisational Competences	**Personal Competences**
• Design Thinking • Project Development • Evaluation • Networking • Flexibility	• Vision&Creativity • Problem Solving • Critical Thinking • Sense of Initiative • Learning to Learn

Fig. 1. Competence Framework ()

Field Competences

The field competences relate to 2 domains:

1. on the one hand to knowledge and skills related to CCE and biochar in the related VET domain (here Horticulture/Agriculture/Construction)
2. on the other hand to the ability to spot ideas and opportunities in relation with this approach (biomass-> biochar applications in the VET sectors) to convert them in actions.

From these considerations we derive the central competence:

"The *Competence to Spot Ideas and Opportunities* for the biochar based Circular Carbon Economy (CCE)"

According to EntreComp Framework the "*Competence to Spot Ideas and Opportunities*" consists of the 5 sub-competences:

- Spotting Opportunities
- Creating Ideas
- Visioning
- Valuing Ideas and
- Ethical behaviour

These sub-competences fit very well to the Design Thinking Process which should be the major training and learning approach applied to the learners and trainers in the B4C project[1].

Additionally, the following "generic" or transversal competences were identified which are needed to introduce the Circular Carbon Economy in the own environment, be it private (civic) activities or professional (on the job).

Generic Competences

Social

- Teamwork (Intercultural)
- Communication
- Leadership: Conflict resolution, Client orientation, Mobilising others

Personal

- Vision & Creativity
- Problem Solving
- Critical (Ethical and sustainable) thinking
- Self-awareness and self-efficacy
- Looking for Opportunities, Taking initiative (*Sense of initiative*)
- Learning through experience *(Learning2Learn)*

Organisational:

- Project Development (incl. Resource Planning; Mobilising resources)
- Financial and economic literacy
- Evaluation (Valuing ideas)
- Networking
- Flexibility (Coping with ambiguity, uncertainty and risk)

In the paper on hand, the competences are thoroughly described by:

- Descriptions consisting of a competence summary and aspects what a learner should know, be able to do and respective attitudes related to these competences.
- A reference system which clusters knowledge, skills and attitudes along 5 competence levels.

In the annex all relevant competences described in terms of abstract and general learning outcomes that relate to an ideal, which a professional working in this field should aspire.

[1] Competence theory, frameworks (WP2) and design thinking course/materials were essential elements of the CPD and are available as learning resources in the trainer courses on the B4C moodle.

2.2.Central Competence to work for the biochar based CCE

This competence describes the ability of a of a person to work in the value chain of the biochar based Circular Carbon Economy (CCE) – in the sense of a "CCE-Literacy". It covers the aspects of recovery, treatment of biomass, the conversion to biochar in different qualities, the further processing of this biochar feedstock into biochar-based products for different purposes and the development of bioeconomy projects and local/regional scenarios.

The theoretical knowledge for the CCE is provided in the open biochar course (https://b4c.threec.eu/biochar-course/)

2.2.1. Central Competence Description

Spot Ideas and Opportunities for the biochar based Circular Carbon Economy (CCE)

This competence describes the personal ability to perceive and recognise sustainable "objects and procedures" and their framework, to increasingly apply facilitation techniques and patterns and to relate it to oneself and to other contexts.

The Spotting ideas and opportunities (in local projects) part relates to the higher competence levels (3-5), whereas the basic levels 1-3 rather relate to basic and theoretical knowledge on biochar and the CCE.

For the trainers and facilitators, this competence - apart from domain specific knowledge on biochar and the CCE - requires knowledge on different ideation and prototyping instruments and strategies, e.g. Spotting opportunities, Creating ideas, Working towards a Vision, Valuing ideas, Checking for Sustainability, etc. and how to apply them in different situations related to the invention of biochar and the CCE in the professional environment, meaning in the own business and at the workplace.

A competent person should be able to Identify and seize opportunities to create value by exploring the social, cultural and economic landscape, Identify needs and challenges that need to be met and establish new connections and bring together scattered elements of the landscape to create opportunities to create value. He/she should be able to create and value Ideas and act responsibly – and all that based on the portfolio of the SDGs.

A competent person is pro-active and motivated to take the initiative and has a positive attitude towards innovation, collaboration and is conscious and committed to the biochar-based economy (CCE).

Knowledge: The learner knows

1. Biochar essentials
2. Recovery, conversion, treatments, applications, bioeconomy, CCE
3. CO2 certification
4. Project Development
5. Entrepreneurship

Skills: relating to

1. Substrate developments for agri- und horticultural purposes
2. Waste and water management and purification
3. Use it in the construction sector
4. develop products and projects

Attitudes:

3. Openness for new applications and procedures based in biochar and CCE
4. Entrepreneurial mindset

2.3. Basic Reference System for the central CCE Competence

LEVEL	KNOWLEDGE	SKILLS Capabilities	ATTITUDES Emotions/Values
5	Know where else… - Transfer Knowledge on Innovation and Entrepreneurship related to the biowaste to biochar value chain	Transfering - Creating and initiating new CCE and biochar projects - Developing CCE communities	Incorporation - Being a biochar and CCE enthusiast - Inspiring others
4	Know when… Applied knowledge related to - biochar and the CCE in the own context / domain and the biomass to biochar value chain	Discovering - Developing new biowaste-biochar and bioproduct applications in local or regional value chains	Commitment - Being committed to contribute to the biowaste to bioeconomy value chain and to biochar production
3	Know how… - Substantiated understanding on relevant biochar properties - Process and product steps - Value chains - Ecological and economic impact	Deciding - Trying out new biowaste-biochar and bioproduct applications in local pilot projects -	Motivation - Being motivated to apply biochar or certain elements of the CCE in the own context -
2	Know why… - Basic knowledge on carbon cycle - Biochar basics	Imitating - Trying out defined activities and practices in biomass to ioproduct value chains in learning labs	Perspective taking - Being interested in different aspects of biochar & the CCE
1	Know-that… - Biochar is a substitute for fossil coal from waste biomass	Perceiving - Observing common practices within the biomass to biochar product chain	Neutral - Perceiving biochar without relating it to oneself

B4C developed its citizen science programme based on this fundamental reference system and learning field. In the following, potential learning pathways will be outlined which include roadshows, and a blended learning programme consisting of face-to-face sessions, development workshops and virtual learning units as knowledge resources provided by the online learning system.

2.4. Blended Learning for COL

How to “teach” Competence Oriented Learning?

Competence Oriented Learning offers should align with the following quality criteria:

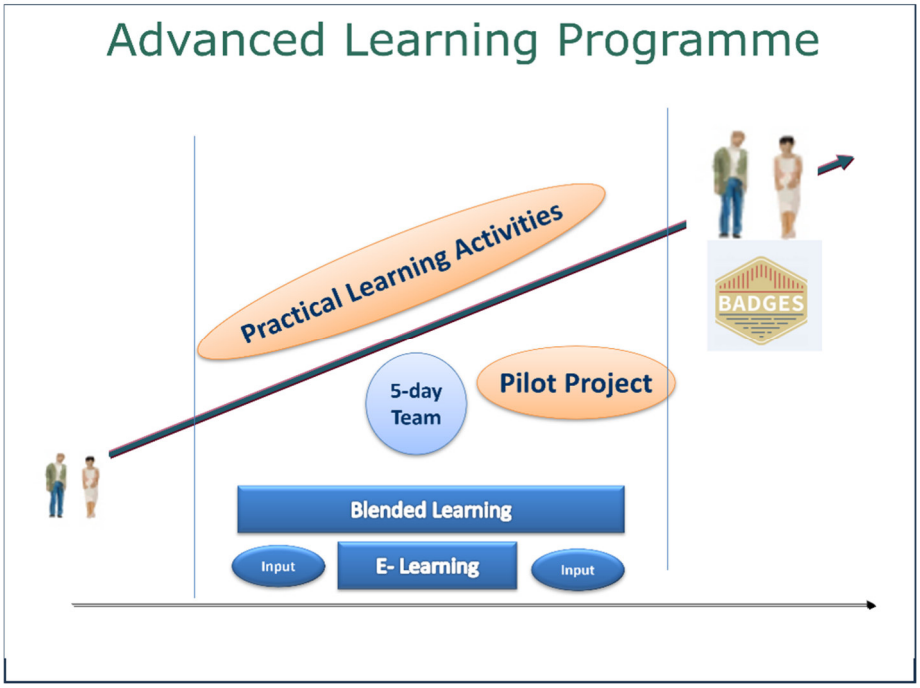
They should:

- Follow a competence-oriented approach
- Reach out beyond formal (in this case e.g. curricular) education
- Promote a learning culture, learning communities via Collaborative Learning
- Be Needs Driven (learner oriented)
- Promote Constructive learning
- Foster Innovation and creativity
- Promote Interdisciplinary (intersectoral) learning
- Promote Interactive learning

The most suitable format to teach and facilitate appropriate Competence Oriented Learning are blended learning approaches which mix different learning modalities, for instance:

- Digitally supported learning
- Face-to-face sessions
- Learning projects
- Assessment and validation of the developed competences

A suitable course structure could be visualised in the following way:



It combines different learning modalities, for instance synchronous (zoom) and asynchronous (moodle/biochar course) e-learning with practical learning activities that may ultimately lead to CCE pilot projects.

3 Transfer in Domain- and Partner-Specific B4C Courses

3.1. Introduction/Concept/Templates

The concept of Competence Oriented Learning was new to most of the training personnel. To facilitate the development of respective courses a set of respective development templates was provided. It consisted of 2 main parts:

- the didactic framework, to simultaneously design and document a) Target groups, b) learning objectives (clustered along knowledge, skills and attitudes and interface to the competence frameworks and the learning fields, the contextualised (domain specific list of contents and the resources and
- a learning pathway pattern, which puts the learning units in a reasonable sequence.

The trainers received input and the patterns during the CPD in Göttingen and transferred them in contextualised courses in their domains:

- DEULA for agricultural courses
- Astredhor for horticulture courses
- IFSB for courses in the construction sector
- FUU referred to AE courses for students of the Folkhighschools ((applied) citizen science)
- blinc applied the methodology in interdisciplinary (civic) development projects for biochar applications un urban allotment gardens and regional development projects.

The general templates and the filled course patterns are attached to the annex.

3.2.Courses in Agriculture

DEULA Nienburg (Germany) – Biochar and Circular Carbon Economy in Agricultural Vocational Education

DEULA Nienburg developed a coherent suite of three complementary learning activities addressing biochar applications, Circular Carbon Economy (CCE), and sustainability-oriented innovation in agriculture. The learning offer combined introductory awareness raising, practical experimentation, and teacher training to support the integration of biochar and circular resource management concepts into agricultural vocational education and training (VET).

Target Groups

The learning activities addressed different stakeholder groups within agricultural VET:

- Agricultural apprentices and VET students (approximately 16–25 years old).
- Vocational schoolteachers and trainers.
- Agricultural advisors and facilitators.
- Adult learners and professionals interested in sustainable agriculture and climate-smart farming systems.

The three pilots were designed to address both learners and educators, thereby supporting capacity building at multiple levels of the agricultural education system.

Learning Objectives

The courses aimed to develop competences related to sustainable agriculture, nutrient management, climate protection, and Circular Carbon Economy principles.

Participants were expected to:

- Understand carbon cycles, biomass utilisation, and Circular Carbon Economy concepts.
- Understand biochar production processes, properties, and agricultural applications.

- Recognise environmental challenges related to nutrient management, slurry systems, emissions, and resource efficiency.
- Analyse agricultural systems from a sustainability perspective.
- Explore practical solutions for climate-friendly farming and circular resource management.
- Strengthen problem-solving, communication, teamwork, and systems-thinking competences.
- Develop openness towards innovation and sustainable agricultural practices.

For teachers and trainers, additional objectives included the application of Design Thinking and learner-centred educational approaches for teaching sustainability-related agricultural topics.

Learning Content

Across the three pilots, participants explored:

- Sustainability challenges in agriculture.
- Circular Carbon Economy principles.
- Carbon cycles and biomass resources.
- Biochar production through pyrolysis.
- Physical and chemical properties of biochar.
- Biochar applications in soil management, nutrient retention, composting, and climate protection.
- Biochar use in slurry systems and emission reduction strategies.
- Sustainable nutrient management and resource efficiency.
- Climate change mitigation in agricultural systems.
- Design Thinking methodologies and participatory learning approaches.
- Development of innovative learning concepts for vocational education.

The courses consistently linked theoretical concepts with practical agricultural examples and real farming situations.

Methodology

DEULA applied a competence-oriented and learner-centred educational approach combining:

- Interactive lectures and presentations.
- Collaborative discussions and reflection exercises.
- Design Thinking workshops.
- Case-study analysis.
- Group work and collaborative problem-solving.
- Practical demonstrations and experiments.
- Farm-based learning activities and field visits.
- Prototype and solution development exercises.
- Presentation and reflection sessions.

A central methodological feature was the integration of Design Thinking, enabling participants to analyse challenges, generate ideas, test solutions, and reflect on implementation opportunities. The learning activities followed the principles of Collaborative, Open and Learner-Centred Vocational Learning (COL&V), encouraging active participation and knowledge co-creation.

Resources and Learning Materials

The pilots utilised:

- The biochar course offered online (https://b4c.threec.eu/biochar-course/)

- Own presentations and visual learning materials.
- Biochar and slurry samples.
- Experimental equipment and laboratory materials.
- Worksheets, case studies, and reflection tasks.
- Farm visits and practical agricultural examples.
- Design Thinking tools, flipcharts, moderation cards, and brainstorming materials.
- Educational videos introducing biochar and Circular Carbon Economy concepts.
- Seminar and workshop facilities designed for collaborative learning.

Together, the three DEULA pilots created a progressive learning pathway linking sustainability education, agricultural practice, and educational innovation. By combining technical knowledge, practical experimentation, and participatory methodologies, the learning offer strengthened the capacity of both learners and educators to contribute to more resource-efficient, climate-friendly, and circular agricultural systems.

3.3.Courses in Horticulture

ASTREDHOR (France) – Biochar in Ornamental Horticulture and Landscape Management

ASTREDHOR developed 3 courses and complementary learning activities introducing biochar as an innovative bio-based material for ornamental horticulture, landscaping, and urban green infrastructure. The learning offer combined awareness-raising, professional training, and demonstration-based learning to support the integration of biochar into horticultural and landscape management practices.

Target Groups

The pilots addressed different stakeholder groups within the horticulture sector:

- Technical advisors supporting ornamental growers and nurseries.
- Landscape professionals, including landscapers, urban green space managers, road network engineers, and ornamental producers.
- Municipal representatives, public authorities, advisory organisations, and environmental practitioners.
- Professionals involved in soil management, plant production, urban greening, and sustainable landscape development.

The activities reached both specialised experts and broader professional audiences with varying levels of prior knowledge of biochar and Circular Carbon Economy concepts.

Learning Objectives

The learning activities aimed to strengthen participants' understanding of biochar production, properties, and applications while promoting sustainable soil and resource management practices.

Participants were expected to:

- Understand biochar production processes and material characteristics.
- Recognise the role of biochar in carbon sequestration and climate mitigation.
- Identify practical applications in ornamental production, landscaping, urban green spaces, growing media, soil improvement, construction, and pollution mitigation.
- Assess the relevance of biochar for their own professional activities and projects.
- Develop openness towards bio-based and circular solutions and sustainable land management approaches.

Learning Content

The training programme covered:

- Introduction to biochar and biomass valorisation.
- Circular Carbon Economy principles and links to European sustainability objectives.
- Biochar production through pyrolysis.
- Physical and chemical properties of biochar.
- Soil fertility and sustainable soil management.
- Carbon storage and climate resilience.
- Biochar applications in ornamental horticulture, seedling production, pot cultivation, and growing media.
- Biochar applications in landscaping, urban greening, environmental remediation, and construction materials.
- Practical examples, case studies, implementation opportunities, and barriers to adoption.

Participants were additionally introduced to digital resources, including the B4C platform and mapping tools supporting identification of biochar suppliers and practical implementation opportunities.

Methodology

ASTREDHOR combined several competence-oriented learning approaches:

- Short webinars and online learning sessions for awareness raising.
- Classroom-based professional training sessions.
- Interactive workshops and facilitated discussions.
- Demonstration-based learning using physical biochar samples.
- Case-based learning linked to participants' professional contexts.

- Guided reflection on implementation opportunities within real projects.
- Peer exchange and collaborative discussion among practitioners.

The methodology emphasised the connection between scientific knowledge and practical application, allowing participants to relate biochar concepts directly to their professional responsibilities and project environments.

Resources and Learning Materials

The learning activities utilised:

- Presentation slides and visual learning materials.
- Experimental results from horticultural research projects.
- Case studies and professional practice examples.
- Biochar samples for hands-on observation and demonstration.
- The CASCADE video and B4C educational resources.
- Digital supplier mapping and information tools.
- Workshop materials supporting discussion, reflection, and project planning.

Together, the three pilots created a progressive learning offer ranging from introductory awareness-raising to in-depth professional training and practical demonstration. The approach enabled horticulture and landscape professionals to explore biochar as a multifunctional solution contributing to sustainable production systems, improved soil management, circular resource use, and climate-resilient green infrastructure.

3.4.Courses in Construction

IFSB (Luxembourg) – Biochar in Construction: Building with Carbon-Storing Materials

IFSB developed and piloted a competence-oriented learning pathway introducing biochar as an innovative and sustainable material for the construction sector. The pilot addressed the increasing need to reduce the carbon footprint of construction materials while promoting Circular Carbon Economy principles and climate-friendly building practices.




Target Groups

The training was implemented through two complementary pathways addressing different professional profiles:

- White-collar professionals (18 participants), including engineers, architects, technicians, and construction planners responsible for material selection and design decisions.
- Blue-collar professionals (12 participants in theory training and 9 participants in practical training), mainly masons and construction workers directly involved in material preparation and implementation on construction sites.

Learning Objectives

The pilot aimed to develop knowledge, skills, and attitudes related to sustainable construction materials. Participants learned about biochar production, carbon sequestration, climate mitigation, and the environmental benefits of biochar-enhanced concrete. Practical competences included selecting sustainable materials, preparing biochar-concrete mixtures, producing construction elements, and assessing

material performance. The training also fostered environmental responsibility, openness to innovation, and critical reflection on sustainability-performance trade-offs.

Learning Content

The learning pathway covered:

- Introduction to biochar and biomass transformation
- Carbon capture and storage mechanisms
- Circular economy principles in construction
- Sustainable concrete production
- Material properties and performance
- Practical applications of biochar in concrete
- Prototype production and testing procedures

Participants complemented the face-to-face training with self-directed learning through the B4C e-learning platform, which provides theoretical modules on biochar, Circular Carbon Economy concepts, and sustainability-related background knowledge.

Methodology

The pilot combined competence-oriented theoretical learning with practical experimentation. White-collar participants engaged in lectures, case studies, discussions, and experience exchange. Blue-collar participants followed a hands-on approach involving demonstrations, concrete mixing exercises, prototype construction, laboratory sample preparation, and group reflection.

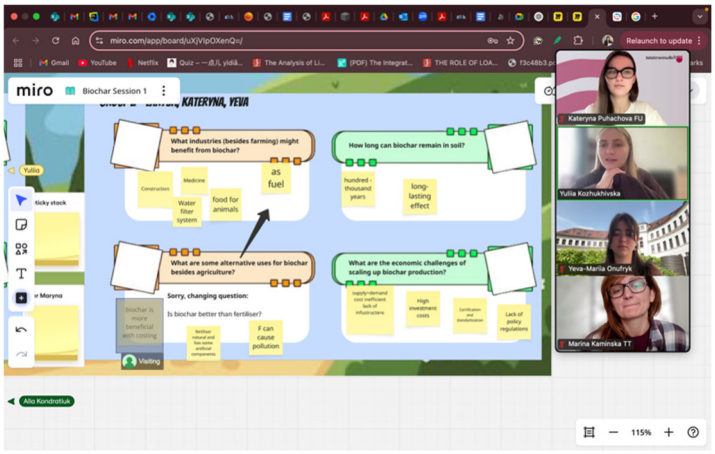
Practical activities included producing biochar-enhanced concrete posts and standardized test cubes for compression testing. This experiential learning approach enabled participants to directly observe the effects of biochar on material properties and stimulated discussions on balancing environmental benefits with technical performance requirements.

The dual learning pathway successfully connected sustainability literacy with vocational practice and demonstrated how innovative bio-based materials can be integrated into construction-related vocational education and training.

3.5.General Vocational and Adult Education Courses

Folkuniversitetet (Sweden) – Biochar and Circular Carbon Economy in Vocational and Adult Education

Folkuniversitetet (FUU) developed a set of three complementary pilot learning activities designed to introduce biochar and Circular Carbon Economy (CCE) concepts into vocational and adult education. The pilots addressed different educational contexts, ranging from teacher training and curriculum development to practical horticultural experimentation and community awareness raising. Together, they created a progressive learning pathway that supports both sustainability literacy and the practical application of biochar-related knowledge.



Target Groups

The pilots addressed three interconnected target groups:

- Vocational Education and Training (VET) teachers and trainers working in sustainability, environmental education, horticulture, and climate-related subjects.
- Adult learners participating in gardening, horticulture, agriculture, and sustainability-oriented courses.
- VET students, educators, and community stakeholders involved in environmental awareness and sustainability initiatives.

This multi-level approach enabled both capacity building among educators and direct engagement of learners and local communities.

Learning Objectives

The learning activities aimed to develop competences related to biochar, climate action, sustainability, and Circular Carbon Economy principles.

Participants were expected to:

- Understand the production, properties, and applications of biochar.
- Recognise the role of biochar in carbon sequestration, soil improvement, and climate mitigation.
- Understand Circular Carbon Economy concepts and their relevance for sustainable development.
- Apply biochar-related knowledge within educational, horticultural, and community contexts.
- Develop skills in observation, experimentation, curriculum development, communication, and community engagement.
- Foster positive attitudes towards sustainability, innovation, evidence-based decision-making, and civic responsibility.

For VET teachers, additional objectives included the development of learning modules, educational resources, and methodological recommendations for integrating biochar into vocational curricula.

Learning Content

Across the three pilots, participants explored:

- Introduction to biochar and its production processes.
- Circular Carbon Economy and sustainability principles.
- Carbon cycles and climate mitigation.
- Soil science, soil health, and water retention.
- Biochar applications in agriculture, horticulture, and urban gardening.
- Scientific observation and data collection methods.
- Curriculum development and educational innovation.
- Community awareness raising and sustainability communication.
- Civic engagement and environmental responsibility.
- Design and implementation of educational materials, demonstrations, and awareness activities.

The content linked scientific understanding with practical applications and real-world sustainability challenges.

Methodology

The learning activities applied a strongly participatory and learner-centred methodology combining:

- Synchronous online learning sessions.
- Facilitated discussions and roundtables.
- Collaborative learning and peer exchange.
- Task-based and project-based learning.
- Design Thinking workshops and ideation processes.
- Hands-on experimentation and observation.
- Data collection and analysis activities.
- Co-creation of learning materials and awareness resources.
- Public engagement and communication activities.

A central feature across all pilots was the integration of Collaborative, Open and Learner-Centred Vocational Learning (COL&V), enabling participants to actively construct knowledge, develop practical solutions, and reflect on sustainability challenges from multiple perspectives.

Resources and Learning Materials

The pilots utilised a broad range of educational resources, including:

- Online learning platforms and video conferencing tools.
- Interactive digital tools such as Miro and Mentimeter.
- Presentations, videos, articles, and educational templates.
- Biochar samples and gardening materials.
- Experimental plots, planters, soil measurement tools, and observation sheets.
- Data collection and analysis templates.
- Posters, infographics, QR-code resources, and awareness materials.
- Methodological recommendation frameworks and curriculum development templates.

Together, the three FUU pilots established a comprehensive learning ecosystem linking educator training, practical experimentation, and community engagement. The approach demonstrated how biochar can serve as an effective entry point for teaching sustainability, climate action, Circular Carbon Economy principles, and green skills development within vocational and adult education.

3.6.Local Capacity Building Programme

The Capacity Building Programme aims at non-sectoral target groups which want to use biochar for the implementation of local bioeconomy or CCE projects.

The programme relates to technical, environmental and business aspects of biomass recovery at regional level, the conversion of biomass into biochar and the development of products in and for regional circular carbon economy scenarios.

This part of the B4C project was realised in 4 Learning&Developing courses and projects in Germany by blinc in Göttingen and Kassel.

The Programme consists of face-to-face seminars, e-learning, explorations to potential conversion plants and moderated development (Design Thinking) workshops.




blinc eG (Germany) – Biochar, Circular Carbon Economy and Climate Management Learning Projects

blinc eG developed a series of competence-oriented learning projects that transferred the B4C methodology into real-world development contexts. The pilots combined vocational, professional, and community-based learning and focused on enabling participants to design and implement Circular Carbon Economy (CCE) projects based on biochar and residual biomass utilisation. Unlike traditional training courses, the learning activities were embedded in authentic regional development challenges, allowing participants to learn while co-creating practical solutions.

Target Groups

The learning projects addressed a diverse range of stakeholders:

- Climate managers and sustainability officers from municipalities and regional administrations.
- Farmers and climate-farming practitioners.
- Agricultural students and vocational learners.
- Environmental NGOs and civil society organisations.
- Technical experts from biomass, energy, and waste management sectors.
- Facilitators, trainers, and members of regional innovation networks.

The interdisciplinary composition of the groups was considered essential for addressing the complexity of Circular Carbon Economy systems.

Learning Objectives

The learning activities aimed to develop competences related to sustainable resource management, carbon sequestration, biochar production, and collaborative project development.

Participants were expected to:

- Understand biochar properties, production processes, and quality requirements.
- Understand Circular Carbon Economy concepts and carbon management approaches.
- Analyse regional biomass potentials and value chains.
- Assess climate impacts and carbon sequestration opportunities.
- Design feasible biochar-based products, services, and implementation scenarios.
- Apply Design Thinking and collaborative innovation methods.
- Strengthen teamwork, systems thinking, and interdisciplinary cooperation.
- Develop positive attitudes towards sustainability, experimentation, critical reflection, and long-term climate action.

Learning Content

Across the different pilots, participants explored:

- Circular Carbon Economy principles.
- Biochar production technologies and biomass conversion pathways.
- Residual biomass assessment and resource mapping.
- Agricultural and environmental applications of biochar.
- Climate farming and carbon sequestration strategies.
- Carbon Management Systems and CO_2 accounting.
- Sustainable product and project development.
- Regional value chains and implementation scenarios.
- Adapted technologies for decentralised biomass conversion.

- Design Thinking, prototyping, and innovation processes.
- Competence assessment and validation through the LEVEL5 methodology.

Participants complemented the face-to-face and online workshops with self-directed learning through the B4C Learning Suite, including modules on biochar fundamentals, CCE concepts, agricultural bioeconomy, and sustainability-related topics.

Methodology

All learning projects followed a Design-Based Collaborative Learning approach that integrated knowledge acquisition with practical project development.

Methods included:

- Asynchronous e-learning and self-assessment.
- Synchronous online seminars and expert workshops.
- Facilitated discussions and peer learning.
- Research tasks and regional data collection.
- Excursions to biomass processing and pyrolysis facilities.
- Design Thinking workshops and creativity techniques.
- Collaborative project development and prototyping.
- Stakeholder analysis and scenario building.
- Reflection activities and competence validation using LEVEL5.

A distinctive feature was that learning was organised around authentic local challenges, enabling participants to co-create solutions while simultaneously developing their competences.

Resources and Learning Materials

The projects utilised:

- The B4C Learning Suite and online learning platform.
- Agricultural Bioeconomy learning modules.
- Carbon Management and CO_2 calculation tools.
- LEVEL5 competence assessment instruments.
- Digital collaboration tools (Moodle, WordPress, Zoom, Miro).
- GIS-based biomass mapping resources.
- Design Thinking templates and facilitation materials.
- Demonstration sites, excursions, and expert inputs from the THREE C network.
- Practical case studies from municipal, agricultural, and climate-farming contexts.

Together, the blinc learning projects demonstrated how competence-oriented learning can be directly linked to regional innovation and sustainability challenges. By combining e-learning, collaborative development processes, Design Thinking, and real-world project implementation, the pilots enabled

participants not only to acquire knowledge about biochar and Circular Carbon Economy principles, but also to apply this knowledge in the design of viable climate-management, climate-farming, and regional carbon sequestration initiatives.

4 Design Templates

4.1. Empty Planning Design pattern

Introduction for Vocational Education Professionals

This planning and documentation template refers to your training/learning offers within the project B4C which aims at introducing Biomass to Biochar and Bioproducts within a circular Economy value chains.

The B4C system is a toolbox for Planning and Documentation.

The first part refers to the planning activities. It describes the teaching/learning project that you have or will deliver, first in a conceptual way (target group, contents, objectives, methods) and secondly as learning pathway of your learners.

The second part of this toolbox comes with an experience report which will document:

1. the evolvement of your learning course and the experiences you made with the development (e.g., what was the most successful part of it, what was challenging).
2. Your conclusions from your first launch: what will remain in the next round, what do you want to improve.
3. It is also interesting to know what you have learnt (as trainers). What was new for you and what will you use in future? We will use this part also as evidence for your LEVEL5 certificates.

In the third part you should provide your experiences in an easy-to-read story about your B4C project.

4.1.1. The Learning Project Description

Please describe the learning project that you developed and delivered during the B4C project along the following pattern.

4.1.2. B4C Project Draft

- Summary

Please give a short summary of your project topic, the background of the project (why did you choose it), the objectives (what should be done and what were the learners supposed to learn), and the final results.

- Target group

Please give a short description of your target group: age, what kind of educational/professional background …

- Themes (content area)

Please list the themes/content areas that you worked on with your learners.

- Learning objectives (for final beneficiaries)
  - Knowledge: *Please describe the knowledge that learners were supposed to acquire during the project.*
  - Skills: *Please describe the skills that learners were supposed to acquire during the project*
  - Attitudes: *Please describe which attitudes learners were supposed to develop during the project.*

- Methods/Activities

Which teaching methods did you use? Which activities did you carry out with your learners?

- Resources and materials

Which resources/materials did you need/use to carry out your project? Please note if you developed the material, bought it, borrowed it, …

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4.1.3. B4C Learning pathway

Please describe the learning pathway of your learning project. Learning pathways are sequences of learning steps or learning units. To fill in the table you need to break down your learning project in chronicle steps/units.

Step No.	Title	Content	Learning objective	Method Activity	Media	Assignment	Learning time
1	Example 1	Theory on SD	To get an overview on SD principles and the SDGs	*INTERDISCIPLINARITY* *COOPERATIVE LEARNING* *LECTURE*	SLIDES VIDEO PRESENTATION	Listen and discussion, clustering of SDGs, …	2h
2	Example 1	Ideation session	To create own ideas on possible SD actions	Design Thinking workshop	Diverse creative thinking tools such as	Brainwriting: Please collect as many ideas as possible on post-its in 10 minutes	½ day
	Add rows						
	Add rows						
	Add rows						

5 Filled Design Templates

5.1. Example Agriculture Course

5.1.1. Project Description: Biochar in Slurry (DEULA)

- **Summary**

This learning activity is designed as a practice-oriented vocational education project focusing on the role of biochar within nutrient management and slurry systems. The educational approach combines sustainability-related agricultural topics with collaborative learning, experimentation and Design Thinking methodologies.

The learning activity should help participants understand current environmental challenges related to manure and slurry management, particularly nutrient losses, ammonia emissions and inefficient resource use within agricultural systems.

Facilitators should guide learners through a combination of:

- theoretical input,
- practical experimentation,
- collaborative analysis,
- and problem-solving activities.

The learning process should support a systems-oriented understanding of agriculture and encourage participants to explore how biochar may contribute to more sustainable nutrient management systems and Circular Carbon Economy approaches.

The project can be implemented as:

- a vocational training module,
- a pilot activity,
- a sustainability workshop,
- or an interdisciplinary agricultural learning project.

- **Target group**

The learning activity is intended for:

- vocational education and training (VET) students in agriculture,
- agricultural apprentices,
- vocational teachers,
- and agricultural trainers.

Participants should ideally have basic knowledge of:

- soil management,
- fertilisation,
- animal husbandry,
- nutrient cycles,
- and agricultural production systems.

The activity is particularly suitable for learners aged approximately 16–25 years.

- Themes (content area)

Facilitators should structure the learning activity around the following thematic areas:

- Nutrient cycles in agriculture
- Environmental challenges related to slurry management
- Ammonia emissions and nutrient losses
- Sustainable nutrient management
- Circular Carbon Economy
- Biochar properties and functions
- Biochar in slurry systems
- Emission reduction and resource efficiency
- Sustainable agricultural systems
- Problem-solving and systems-oriented thinking

The themes should always be connected with practical agricultural examples and real farming situations.

- Learning objectives (for final beneficiaries)

- Knowledge:

The learning activity should enable learners to understand nutrient cycles within agricultural systems and recognise environmental challenges related to slurry management. Participants should develop knowledge about Circular Carbon Economy principles and understand the functional role of biochar within agricultural systems.

Facilitators should ensure that learners can identify possible agricultural applications of biochar and connect theoretical sustainability concepts with practical farming systems. The educational process should also strengthen understanding of the relationship between agriculture, climate protection and resource management.

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- Skills:

Participants should be encouraged to analyse agricultural systems, identify sustainability-related challenges and evaluate possible solution approaches. Through practical experimentation and collaborative learning activities, learners should strengthen their ability to conduct observations, discuss results and reflect critically on agricultural processes.

The project should also support the development of teamwork, communication, collaborative problem-solving and systems-oriented thinking. Facilitators should encourage learners to actively participate in discussions and contribute their own ideas and perspectives.

.Attitudes:

The learning process should strengthen environmental awareness, openness towards innovation and sustainability-oriented thinking. Learners should be encouraged to reflect critically on current agricultural systems and explore more sustainable approaches for nutrient management and resource use.

The activity should also support collaborative learning attitudes and encourage learners to recognise the importance of agriculture within climate protection and sustainable development.

- Methods/Activities

Facilitators should combine theoretical instruction with highly participatory and practice-oriented educational approaches. The workshop should integrate introductory presentations, collaborative group discussions, case study analysis, Design Thinking activities, practical mini experiments, farm visits, reflection sessions and structured presentations.

The learning process should encourage learners to actively explore agricultural systems instead of passively receiving information. Practical activities should focus on nutrient management, slurry systems, emission reduction and sustainability-related agricultural challenges.

Facilitators are encouraged to adopt a facilitation-oriented teaching role and support collaborative learning processes. Reflection and group discussion should play a central role throughout the learning process in order to strengthen learner participation and critical thinking.

- Resources and materials

The following materials are recommended for implementation:

- biochar samples,
- slurry samples,
- experimental containers and measuring tools,
- worksheets and reflection tasks,
- flipcharts and moderation materials,
- visual learning materials and presentations,

- farm case studies,
- and seminar or workshop spaces suitable for collaborative work.

Whenever possible, facilitators should integrate practical demonstrations and real agricultural examples to strengthen learner engagement.

5.1.2. Learning pathway

Step No.	Title	Content	Learning objective	Method Activity	Media	Assignment	Learning time
1	Introduction	Slurry management & environmental challenges	Understand key problems	*Lecture & discussion* *Activity:* Group discussion	Slides	Identify challenges	1h
2	Teacher Preparation	Design Thinking	Understand methodology	Workshop *Activity:*Trainer work	Flipchart	Develop ideas	1 day
3	System Analysis	Farm systems	Identify weak points	Group work *Activity:Case study*	Worksheets	Analyse system	2h
4	Experiment	Biochar + slurry	Understand effects	Experiment *Activity:Conduct experiment*	Lab materials	Document results	2h
5	Solution Developmen	Practical applications	Apply knowledge	Design Thinking *Activity:Group work*	Flipchart	Develop solutions	2h
6	Presentation	Results	Communication skills	Presentation Activity:Pitch	Slides	Present ideas	1h

7	Reflection	Evaluation	Critical thinking	Discussion *Activity:*Reflection		Reflect learning	1h

5.2.Example Horticulture Course

5.2.1. Project Description on Biochar in landscape projects

- **Summary**

This pilot focused on delivering classroom-based training sessions on soil fertility and management in landscape projects, with a specific emphasis on integrating biochar. Two sessions were organised: one during a professional forum in Nantes in collaboration with UNEP (French association of landscapers), and one in the Colmar region. The objective was to strengthen technical knowledge and support the practical use of biochar among landscape professionals and related stakeholders.

- **Target group**

Small groups of professionals including:

- Landscapers
- Road network engineers
- Ornamental growers

Participants had technical backgrounds and were directly involved in landscape design, implementation, or management, with varying levels of prior knowledge on soil fertility and biochar.

- **Themes (content area)**

The pilot focused on soil fertility and management in landscape projects, introducing biochar as a bio-based and circular solution. It covered the production process and key properties of biochar, and explored its integration into professional practices. Applications addressed included soil improvement, carbon sequestration, growing media, urban green spaces, construction, and pollution mitigation.

- **Learning objectives (for final beneficiaries)**

Knowledge

- Understand soil fertility principles in landscape projects
- Understand what biochar is and how it is produced
- Know its main properties and functions
- Identify possible applications in landscaping and urban contexts

Skills

- Ability to integrate soil management strategies into projects
- Ability to assess the relevance of biochar in different contexts

- Capacity to apply knowledge to professional cases

Attitudes

- Increased awareness of sustainable soil management
- Openness to bio-based and circular solutions
- Interest in adopting innovative practices in projects

Methods / Activities

- Classroom-based training sessions
- Oral presentations and structured explanations
- Case-based discussions linked to participants' professional contexts
- Interactive exchanges between participants
- Use of visual materials (slides, examples)

Resources and materials

- Training presentations (slides)
- Case studies and practical examples
- Supporting materials on biochar applications

Learning pathway

Each training session lasted one day and followed a structured progression:

- Introduction to soil fertility and landscape management
- Introduction to biochar (definition, production, properties)
- Biochar as a circular solution in landscape projects
- Applications and integration into professional practices
- Discussion and exchange on participants' projects

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5.2.2. Learning pathway

This learning project lasted half a day

Step No.	Title	Content	Learning objective	Method Activity	Media	Assignment	Learning time
1	Soil fertility and landscape management	Definition of soil fertility, understanding the soil functions and how it impacts plant growth.	Understand how landscape practices influence soil fertility.	Presentation & discussion	Slides	Listening, Q&A	2 hours
2	Introduction to biochar (definition, production, properties)	Definition, production, properties, B4C project context	Understand biochar fundamentals Link biochar to EU sustainability initiatives	CASCADE video projection	CASCADE video + slides	Reflection	1hour 30 minutes
3	Applications and integration into professional practices	Soil, carbon, urban and environmental uses of Biochar. Examples of existent projects, success and barriers	Identify biochar potentials in practice	Presentation + Interactive discussion	Slides	Listening, Q&A	2 hours
4	Discussion and exchange on participants' projects	how to implement Biochar into their current project Q&A session on what was presented	Connect theory with practice	Interactive session	participants project	Reflect on how Biochar could be implemented in one of your project	1hour 30 minutes

5.3. Example Construction Course

5.3.1. Project Description: Building with Carbon-Storing Materials (IFSB)

- **Summary**

The B4C pilot project developed by IFSB focused on introducing Biochar as a sustainable and innovative material for the construction sector. The initiative responded to the growing need to reduce the carbon footprint of construction materials while supporting circular economy value chains.

Biochar represents a promising solution because it:

- Captures and stores CO2 in a stable form
- Contributes to Climate change mitigation
- Can be integrated into construction materials such as concrete
- Supports the transition toward sustainable construction practices

The pilot project was implemented through two complementary learning pathways:

- A theoretical awareness and knowledge development pathway for white-collar professionals
- A practical skills development pathway for blue-collar professionals

The final results included increased awareness of Biochar applications, hands-on experimentation with Biochar-based concrete, and the identification of potential technical trade-offs such as slightly reduced compressive resistance.

- **Target group**

1) White-Collar Participants

- Technicians
- Engineers
- Architects
- Construction professionals involved in design and planning activities

Number of participants:

18 professionals

Training date:

January 29, 2026

2) Blue-Collar Participants

- Masons working in the construction sector

Characteristics:

- Practical construction professionals responsible for material preparation and structural implementation
- Directly involved in concrete production and building activities

Training dates:

Theory session: March 06, 2026 => 12 participants

Practical session: March 20, 2026 => 9 participants

- Themes (content area)

The following themes were addressed during the pilot project:

- Introduction to Biochar and biomass transformation
- Carbon capture and storage mechanisms
- Circular economy principles in construction
- Environmental impact of construction materials
- Sustainable concrete production
- Material properties and performance
- Practical application of Biochar in concrete
- Prototype production and testing preparation

- Learning objectives (for final beneficiaries)

- Knowledge:

Participants were expected to understand:

- The definition and production process of Biochar
- The role of Biochar in CO2 storage and climate mitigation
- Environmental benefits of sustainable construction materials
- Basic technical properties of Biochar-based concrete
- The relationship between sustainability and structural performance

- Skills:

Participants were expected to develop:

- Ability to identify sustainable construction materials
- Ability to apply Biochar in concrete mixtures
- Ability to produce construction elements using Biochar
- Ability to evaluate material behavior in practical conditions

- Attitudes:

Participants were encouraged to develop:

- Awareness of environmental responsibility
- Openness to innovation in construction materials
- Critical thinking regarding sustainability-performance trade-offs
- Professional curiosity and experimentation mindset

- Methods/Activities

The training methodology combined theoretical learning with hands-on experimentation.

White-Collar Methods

- Technical lectures
- Interactive discussions
- Case-based learning
- Experience sharing

Blue-Collar Methods

- Demonstrations
- Practical exercises
- Real-life material preparation
- Prototype construction (cubes, posts…)
- Group reflection and feedback sessions

- Resources and materials

- Biochar material
- Cement
- Aggregates
- Water
- Concrete mixing equipment
- Molds for 15 cm sided cubes
- Construction tools
- Training facilities at the IFSB training center
- Presentation slides and technical documentation
- 2 Trainers + 1 engineer

Biochar was purchased. The rest of the materials were available at IFSB and have been used accordinglly to the project's needs.

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5.3.2. Learning pathway

Please describe the learning pathway of your learning project. Learning pathways are sequences of learning steps or learning units. To fill in the table you need to break down your learning project in chronicle steps/units.

Step No.	White collars	Content	Learning objective	Method Activity	Media	Assignment	Learning time
1	**Introduction to Sustainable Construction**	Overview of climate challenges in the construction sector	To better understand how the construction sector is related to CO2	Lecture	Slides Video presentation	Listening and interaction / discussion with the trainer	1/2h
2	**Introduction to Biochar**	Definition, production process, and environmental relevance	To create own vision of Biochar and its relevance	Lecture and discussion	Slides Video presentation		1/2h
3	**Biochar in construction**	Carbon capture and storage mechanisms	Applications in concrete and discussion of performance implications	Lecture and Q&A	Slides Video presentation		1h

Step No.	Blue collars	Content	Learning objective	Method Activity	Media	Assignment	Learning time
1	**Introduction to Biochar**	General explanation of Biochar and sustainability concepts	To better understand how the construction sector is related to CO2	Lecture	Slides Video presentation	Listening and interaction / discussion with the trainer	1h
2	**Concrete and Biochar Mixing**	Demonstration of mixing principles and material preparation	Proportions of different "recipes": percentage of added Biochar	Explanations with an engineer	On site (exercise hall)	Mix properly different ingredients (concrete, sand, water, Biochar, additives…)	2h
3	**Construction Exercises**	Building concrete posts using Biochar-based mixtures	Observe the materials mix, how it reacts	Exercise on site with a trainer	On site (exercise hall)	Building posts on site, using Biochar based mix	4h
4	**Testing Preparation** **(same time as construction exercises)**	Manufacturing 15 cm sided cubes for compression and resistance testing	Understand how different quantities of Biochar affect concrete resistance	Exercise in IFSB's concrete lab site with a trainer	On site (concrete lab)	Manufacturing cubes with different "recipes"	2h

5.4. Example AE project

5.4.1. Project Description Biochar Urban Garden Booster

- **Summary**

At Folkuniversitetet, adult learners enrolled in the Gardening course participated in a student-led micro-experiment focused on using biochar to improve soil quality in small urban gardens. These settings included school gardens, community plots, and rooftop planters. Learners investigated how biochar influences plant growth, water retention, and soil health.

This pilot was selected because it offers an accessible and hands-on entry point into the carbon cycle and the circular economy. By observing and measuring differences between biochar-amended and non-amended soil, students developed both practical skills and scientific literacy.

The final result of the pilot was a comparative dataset documenting measurable differences between biochar-treated and untreated soil plots, collected and analysed by the students themselves.

- **Target group**

The pilot involved adult learners (VET students) attending Folkuniversitetet's Gardening course. Participants came from vocational training backgrounds including:

- Agriculture
- Horticulture
- Natural sciences
- Landscaping

These are adult learners with varied prior experience, united by an interest in practical, sustainable cultivation practices.

- **Themes (content area)**

- Biochar: production, properties, and applications
- Soil science: structure, water retention, and nutrient cycling
- Carbon sequestration and the carbon cycle
- Circular economy principles in urban agriculture
- Scientific observation and data collection methods
- Sustainable urban gardening and climate-smart horticulture

- Learning objectives (for final beneficiaries)

- Knowledge:

- The properties of biochar and how it differs from regular compost or organic matter
- The basic principles of the carbon cycle and how biochar contributes to carbon sequestration
- How soil amendments affect plant growth, water retention, and soil microbiology
- The role of circular economy practices in sustainable agriculture

- Skills:

Learners were expected to develop practical competencies in:

- Setting up and managing a controlled micro-experiment (biochar vs. control plots)
- Systematic observation and scientific data collection (soil moisture, plant height, leaf health)
- Analysing and interpreting comparative datasets
- Applying biochar correctly to soil in garden or planter settings

- Attitudes:

The pilot aimed to foster:

- Curiosity and openness toward innovative, nature-based solutions
- A sense of personal agency in addressing climate challenges through everyday horticultural practice
- Commitment to evidence-based decision-making in sustainable gardening
- Appreciation for the intersection of science, ecology, and circular economy thinking

- Methods/Activities

- Introduction lecture and discussion: What is biochar? Why does it matter for soil and climate?
- Hands-on setup of micro-experiment plots: learners prepared paired plots/planters with and without biochar amendment
- Ongoing observation and data logging: students measured soil moisture, tracked plant growth, and noted visible differences over several weeks

- Group data analysis session: learners compiled their individual datasets into a group comparison
- Reflection and presentation: small groups presented findings and discussed implications for urban gardening practice

Resources and materials

- Biochar (sourced/procured for the course; learners were briefed on its provenance and production method)
- Garden plots, planters (school/community facilities)
- Soil moisture meters, rulers, and observation sheets
- Presentation slides introducing biochar and the carbon cycle (developed by the teaching team)
- Data recording templates (developed for the pilot)
- Reference materials on circular economy and sustainable horticulture

5.4.2. Learning pathway

Please describe the learning pathway of your learning project. Learning pathways are sequences of learning steps or learning units. To fill in the table you need to break down your learning project in chronicle steps/units.

Step	Title	Content	Learning Objective	Method / Activity	Media	Assignment	Time
1	Introduction to Biochar & Circular Economy	What is biochar? Carbon cycle basics, circular economy principles, soil science overview	Understand biochar properties and relevance to soil health	Lecture & group discussion; cooperative learning	Slides, video presentation	Concept map of biochar in circular economy	2h
2	Experiment Design	Scientific method, hypothesis setting, preparing biochar-amended vs. control plots	Apply biochar correctly; set up controlled micro-experiment	Design thinking workshop; hands-on practical	Data recording templates, garden tools, biochar	Set up and document experimental plots	½ day
3	Observation & Data Collection	Weekly monitoring: soil moisture, plant height, leaf health; structured data logging	Practice systematic scientific observation	Student-led fieldwork; observation journals	Moisture meter, observation sheets, ruler	Weekly data log (soil moisture, plant growth)	3–4 weeks
4	Data Analysis	Compiling individual data into group comparison tables; identifying patterns and differences	Analyse and interpret comparative datasets	Cooperative learning; group data synthesis	Spreadsheet or paper table templates	Group comparative dataset (final deliverable)	2h
5	Presentation & Reflection	Presenting findings; discussing implications for urban gardening; reflecting on the circular economy link	Communicate results; connect findings to sustainability goals	Peer presentations; plenary reflection; interdisciplinary discussion	Flipchart / slides for presentation	Short group presentation + written reflection	2–3h

5.5. Example Local Development Project

5.5.1. Project Description: Garden Waste to Biochar: A Low-Tech Pyrolysis Approach (blinc)

- Summary

The learning project focused on raising awareness about the potential of biomass resources in allotment gardens (Schrebergärten) and demonstrating how biomass can be transformed into a valuable climate protection and soil improvement product through pyrolysis.

The project was implemented with 8 tenants sharing a plot in an allotment garden colony in Göttingen, Germany. The idea emerged from the observation that considerable amounts of biomass are generated every year in allotment gardens through pruning, weeds, grass clippings, and other plant residues. Most of this biomass is either composted or disposed of without considering its additional value for carbon sequestration and soil enhancement.

The main objectives were to help participants understand biomass flows within their garden plot, calculate the amount of biomass produced annually, learn about the principles and benefits of biochar production, and gain practical experience in producing and applying biochar.

During the workshop, participants estimated the annual biomass production of their plot and identified the proportion that was currently underutilized and suitable for conversion through low-tech pyrolysis. The benefits of pyrolysis and biochar for climate protection, soil health, nutrient and water retention were discussed. In a hands-on activity, participants produced biochar using a mini-Kon-Tiki kiln, activated the biochar with stinging nettle tea, and applied it directly to the garden soil.

An additional "Stakeholder and Biochar Network Mapping" exercise was carried out to assess the wider impact of the approach. Participants extrapolated the biomass calculations from their plot to the entire allotment garden colony and estimated the potential quantities of biochar and carbon that could be stored if more gardeners adopted the practice. This exercise encouraged participants to think beyond their own garden and consider collective action within the community.

The workshop concluded with a discussion on involving tenants from other plots and exploring future collaboration opportunities. As a result, participants developed a new perspective on biomass as a valuable resource and gained practical knowledge about circular bioeconomy solutions at the local level. Furthermore, participants recognized the potential of biochar not only as a soil amendment and climate mitigation tool, but also as a catalyst for community building, cooperation, and collective action within the allotment garden community.

- Target group

The target group consisted of 8 adult members of a shared allotment garden plot in Göttingen. The participants were between approximately 26 and 45 years old and represented diverse professional backgrounds, including students, social workers, nature conservation practitioners, forestry scientists, and consumer protection professionals.

Most participants had practical gardening experience but little prior knowledge of biochar production, pyrolysis technologies, or the role of biomass management in climate protection and circular economy concepts.

- Themes (content area)

- Biomass resources in allotment gardens
- Circular economy and local resource cycles
- Introduction to biochar and pyrolysis
- Carbon sequestration and climate protection
- Soil fertility and soil improvement
- Sustainable biomass management
- Estimation and calculation of biomass potentials
- Community-based environmental action
- Stakeholder mapping and scaling approaches

- Learning objectives (for final beneficiaries)

– Knowledge

Participants were expected to:

- Understand the concept of biomass as a renewable resource.
- Learn the basic principles of pyrolysis and biochar production.
- Understand the environmental benefits of biochar, including carbon storage and soil improvement.
- Recognize the connection between local biomass management and climate protection.
- Understand how local biomass potentials can contribute to larger-scale environmental impacts.

– Skills

Participants were expected to:

- Estimate and calculate biomass quantities generated on their garden plot.
- Identify suitable biomass materials for biochar production.

- Safely operate a mini-Kon-Tiki kiln under supervision.
- Produce and activate biochar using locally available organic resources.
- Apply biochar appropriately in garden soils.
- Calculate and visualize biochar potential for larger groups of garden plots.
- Discuss opportunities for scaling biomass utilization within their community.

– Attitudes

Participants were expected to:

- Develop greater appreciation for biomass as a valuable resource rather than waste.
- Increase their motivation to contribute to climate protection through local action.
- Strengthen their interest in sustainable gardening practices.
- Foster a collaborative attitude towards community-based environmental initiatives.
- Recognize the value of collective action in achieving environmental goals.

▪ Methods/Activities

The project combined participatory, experiential, and inquiry-based learning approaches with elements of Design Thinking. The learning process was designed around a real-world sustainability challenge: how to better utilize locally available biomass resources in allotment gardens while contributing to soil health, climate protection, and circular economy objectives.

Participants were guided through a learning journey that reflected key phases of the Design Thinking process:

- **Empathise and Understand:** Participants explored their own gardening practices and reflected on how biomass is currently generated, managed, and often overlooked as a resource. Through facilitated discussions, they connected their personal experiences with broader sustainability challenges.
- **Define:** Together, participants analysed biomass flows on their garden plot and identified the challenge of underutilized biomass that could potentially be transformed into a valuable resource through low-tech pyrolysis.
- **Ideate:** Participants discussed alternative biomass management strategies and explored opportunities for biochar production, soil improvement, carbon sequestration, and community engagement. Different future scenarios and stakeholder perspectives were considered.
- **Prototype:** Through a hands-on activity, participants produced biochar using a mini-Kon-Tiki kiln, activated it with nettle manure (Brennnesseljauche), and applied it in the garden. This

practical experimentation allowed them to test a tangible circular economy solution in a real-world setting.

- **Test and Reflect:** Participants evaluated the process, discussed expected impacts, and reflected on lessons learned. Through a Community Stakeholder and Biochar Network Mapping exercise, they explored how the approach could be adapted, improved, and scaled within the allotment garden community and beyond.

The methodology combined:

- Participatory discussions and peer learning,
- Inquiry-based exploration of local biomass resources,
- Collaborative problem-solving and systems thinking,
- Practical experimentation and prototyping,
- Stakeholder mapping and community-oriented innovation,
- Structured reflection and knowledge exchange.

- Resources and materials

B4C Project Resources

- Biochar Course
- Biomass Factsheet (calculation template for estimating biomass potential)
- Circular Carbon Management System (CCMS) tool for assessing carbon sequestration potentials.
- Stakeholder Map (template for identifying relevant actors and collaboration opportunities)
- B4C Biochar Box including a Mini-Kon-Tiki kiln for small-scale biochar production.

Existing and Locally Available Resources

- Gardening tools available on-site (rakes, shovels, buckets, wheelbarrows).
- Biomass generated within the allotment garden (pruning residues).
- Stinging nettle tea for biochar activation.
- Meeting and workshop space within the allotment garden.

5.5.2. Learning pathway

Please describe the learning pathway of your learning project. Learning pathways are sequences of learning steps or learning units. To fill in the table you need to break down your learning project in chronicle steps/units.

Step No.	Title	Content	Learning objective	Method/Activity	Media	Assignment	Learning time
1	Introduction to Biomass and Circular Economy	Introduction to biomass resources in allotment gardens, circular economy principles, and climate protection through biochar.	Participants understand biomass as a valuable resource and recognize the role of biochar for circular carbon economy.	Interactive group discussion.	Presentation, examples of biomass materials.	Identify biomass sources currently generated on the garden plot. Self learning in biochar course	30 min + Individual self learning time
2	Biomass Assessment of the Garden Plot	Identification and estimation of annual biomass production from pruning residues, clippings, and other woody plant material.	Participants learn to quantify biomass resources and assess currently unused potentials.	Participatory calculation exercise.	Biomass factsheet worksheet, CCMS calculator.	Estimate the annual volume of underutilized biomass on the shared plot.	30 min
3	Biochar and Pyrolysis Basics	Introduction to pyrolysis, biochar production, soil improvement, and practical applications in gardening.	Participants understand how biochar is produced and its agronomic benefits.	Short lecture combined with questions and discussion.	Presentation, biochar samples.	Discuss potential benefits and concerns regarding biochar use in allotment gardens.	30 min

4	Hands-on Biochar Production	Practical production of biochar using a mini-Kon-Tiki kiln from biomass collected from the garden plot.	Participants gain practical experience in small-scale biochar production and safe handling of pyrolysis processes.	Supervised hands-on activity.	Mini-Kon-Tiki kiln, biomass feedstock.	Produce biochar and document observations.	30 min
5	Biochar Activation and Application	Charging biochar with stinging nettle tea and applying it to selected garden beds.	Participants learn how biochar can be activated and integrated into sustainable soil management practices.	Practical group activity.	Produced biochar, stinging nettle tea, garden tools.	Apply activated biochar and discuss expected effects on soil and plants.	30 min
6	Stakeholder Mapping and Upscaling scenario	Identification of potential stakeholders and discussion of how a wider biomass-to-biochar initiative could be developed within the allotment garden colony and local community.	Participants recognize the importance of cooperation and identify opportunities for scaling circular carbon economy solutions.	Stakeholder mapping workshop and plenary discussion.	Stakeholder map template.	Create a stakeholder map identifying possible partners, beneficiaries, biomass providers, and multipliers.	30 min

6 Annexes Competence Frameworks

6.1. REFERENCE SYSTEM – Create ideas & opportunities on the CCE

	KNOWLEDGE		SKILLS//CAPABILITIES		ATTITUDES/VALUES	
L	Level Titles	Level description	Level Titles	Level description	Level Titles	Level description
5	Knowing where else (strategic transfer)	Knowing how to transfer the CCE strategy to the corporate level. Knowing how to support other departments to act successfully in implementing CCEs.	Developing, constructing, transferring	Being able to transfer ideation and prototyping strategies for CCE invention on the corporate business level. Actively planning and creating new SD-activities based on Design thinking and appreciative inquiry.	Incorporation	Having internalised CCE invention as a fundamental personal intrapreneurial mindset. Being an inspiration for others in their ideation and prototyping activities for the CCE
4	Knowing when (implicit understanding)	Knowing when to apply right instruments from the portfolio of different ideation and prototyping approaches and tools to develop a concept and prototype for CCEs.	Discovering acting independently	Creating and executing a prototyping strategy to invent the CCE in the own context and professional domain.	Self-regulation, Commitment	Being determined and pro-active to create ideas and prototypes in the own environment to implement CCEs. Finding it important to be creative and innovative in this respect.
3	Knowing how	Knowing different ideation and prototyping approaches, techniques related to: • Checking for the CCE. • Spotting opportunities • Creating ideas • Working towards a Vision Theoretically knowing how to act along an ideation and prototyping concept for Sustainable development	Deciding/ selecting	Being able to create ideas to invent CCEs in the own context guided by the explorer programme. Being able to apply ideation and selection tools from a given (known) portfolio for the exploration of CCEs	Motivation/ appreciation	Valuing sustainability and CCEs in general. Being motivated to develop own ideation and prototyping competences and visions.
2	Knowing why (distant understanding)	Having basic knowledge on sustainable development and CCEs. Knowing that idea creation, a multi-perspective view on the CCEs and the check of ideas is essential	Using, imitating	Being able to teamwork for developing a vision for the exploration of fitting CCEs in the own working environment	Perspective taking	Being curious and interested in ideating and prototyping and spotting of opportunities for sustainable development.
1	Knowing what	Knowing that sustainable development is an important concept of nowadays civic and professional life.	Perceiving	Perceiving and recognising the concept of creating ideas and opportunities for sustainable development without taking further steps.	Self-orientation	Perceiving the concept of sustainable development without relating it to oneself.

6.1.1. Sub-competence 1: Spotting opportunities on the CCE

L	LEVEL5 Titles	LEVEL5 Hints	Entre-Comp Hints	Entre-Comp Titles	Identify, create and seize opportunities	Focus on challenges	Uncover needs	Analyse the context
5	Developing, constructing, transferring	Strategy Versatility Incorporation	Contributing substantially Taking responsibility for contributing to complex developments in a specific field	*Driving transformation, innovation and growth*: Transform Expand	• I can judge opportunities for creating value and decide whether to follow these up at different levels of the system I am working in (for example, micro, meso or macro). • I can spot and quickly take advantage of an opportunity.	• I can cluster different opportunities or identify synergies among different opportunities to make the most out of them. • I can define opportunities where I can maintain a competitive advantage.	• I can produce a 'roadmap' which matches the needs with the actions needed to deal with them and helps me create value. • I can design projects which aim to anticipate future needs.	• I can monitor relevant trends and see how they create threats and new opportunities to create value. • I can promote a culture within my organisation open to spotting the weak signals of change, leading to new opportunities for creating value.
4	Discovering new contexts Developing Acting independently	Pro-Activity Applied knowledge Disturbed/ new contexts	Taking responsibility for making decisions and working with others. With some guidance and together with others.	*Taking responsibility* Reinforce Improve	• I can describe different analytical approaches to identify entrepreneurial opportunities. • I can use my knowledge and understanding of the context to make opportunities to create value..	• I can take apart established practices and challenge mainstream thought to create opportunities and look at challenges in different ways. • I can judge the right time to take an opportunity to create value.	• I can carry out a needs analysis involving relevant stake-holders. • I can identify challenges related to the contrasting needs and interests of different stakeholders.	• I can identify the boundaries of the system that are relevant to my (or my team's) value-creating activity. • I can analyse an existing value-creation activity by looking at it as a whole and identifying opportunities to develop it further.
3	Deciding/ selecting	Theory knowledge Known/ prepared contexts	On my own and together with my peers. Taking and sharing some responsibilities.	*Building independence* Experiment Dare	• I can explain what makes an opportunity to create value. • I can proactively look for opportunities to create value, including out of necessity	• I can identify opportunities to solve problems in alternative ways. • I can redefine the description of a challenge, so that alternative opportunities address it may become apparent.	• I can explain that different groups may have different needs. • I can establish which user group, and which needs, I want to tackle through creating value.	• I can tell the difference between contexts for creating value (e.g., communities and informal networks, existing organisations, the market). • I can identify my personal, social and professional opportunities for creating value, both in existing organisations or new ventures.

2	Using, imitating	Applying under su-per-vi-sion Exercis-ing Trying out	Under direct supervision. With support from others, some auton-omy, with my peers.	*Relying on support from others* Discover Explore	• I can find opportunities to help others. • I can recognise opportunities to create value in my com-munity and surroundings.	• I can find different examples of challenges that need solu-tions. • I can recognise challenges in my community and surround-ings that I can contribute to solving.	• I can find examples of groups who have benefited from a solution to a given problem. • I can identify needs in my community and surround-ings that have not been met.	• I can tell the difference between different areas where value can be created (e.g. at home, in the community, in the environment, or in the economy or society). • I can recognise the different roles the public, private and third sectors play in my region or country
1	Perceiving	Start	**Start**	**Start**	Start	Start	Start	Start

6.1.2. Sub-competence 2: Creating ideas on the biochar based CCE

L	LEVEL5 Ti-tles	LEVEL5 Hints	Entre-Comp Hints	Entre-Comp Ti-tles	Be curious and open.	Develop ideas.	Define problems	Design value	Be innovative
5	Developing, constructing, transferring	Strategy Versatil-ity Incorpo-ration	Contributing substantially Taking re-sponsibility for contrib-uting to com-plex develop-ments in a specific field	*Driving trans-formation, in-novation and growth*: Transform Expand		• I can design new processes to involve stakeholders in gener-ating, developing and testing ideas that create value. • I can tailor a variety of ways of involving stakeholders to suit the needs of my value-creat-ing activity.	• I can use a mix of creative techniques to keep generat-ing value over time. • I can initiate, develop, manage and complete a creative pro-ject.	• I can design and put in place in-nova-tive processes to create value. • I can apply different design ap-proaches to create value through new products, pro-cesses or services.	• I can manage innovation pro-cesses that respond to emerging needs and make the most of op-portunities as they become available. • I can identify the steps needed to research the potential for an innovative idea in light of its de-velop-ment into an existing en-terprise, a new venture or an oppor-tunity for social change.
4	Discovering new con-texts Developing Acting inde-pendently	Pro-Ac-tivity Applied knowled ge Dis-turbed/	Taking re-sponsibility for making decisions and working with others. With some guidance and	*Taking re-sponsibility* Reinforce Improve	• I can combine my under-standing of different con-texts to transfer knowledge, ideas and so-lutions across different ar-eas. • I can actively search for new solutions that	• I can set up processes to in-volve stake-holders in finding, develop-ing and testing ideas. • I can describe different tech-niques to test innovative ideas with end users.	• I can help others create value by encouraging experimenta-tion and using creative tech-niques to approach problems and generate solutions. • I can describe and explain dif-ferent approaches to shaping open-ended problems and	• I can develop and deliver value in stages, launching with the core fea-tures of my (or my team's) idea and progressively adding more. • I can create (alone or with oth-ers) products or services that	• I can describe different levels of innovation (for example, incre-mental, breakthrough or trans-formation-al) and their role in value-creating activities. • I can describe how innovations diffuse in society, culture and the market.

		new contexts	together with others.		improve the value-creating process.		different problem-solving strategies.	solve my problems and my needs.	
3	Deciding/ selecting	Theory knowledge Known/ prepared contexts	On my own and together with my peers. Taking and sharing some responsibilities.	*Building independence* Experiment Dare	• I can actively search for new solutions that meet my needs. • I can experiment with my skills and competences in situations that are new to me.	• I can test the value of my solutions with end users. • I can experiment with different techniques to generate alternative solutions to problems, using available resources in an effective way.	• I can reshape open-ended problems to fit my skills. • I can take part in group dynamics aimed at defining open-ended prob-lems.	• I can assemble, test and progressively refine proto-types that simulate the value I want to create. • I can identify the basic functions that a prototype should have to illustrate the value of my idea.	• I can judge if an idea, product or process is innovative or just new to me. • I can tell the difference between types of innovations (for example, process versus product innovation and social innova-tion, incre-mental versus disruptive innovation).
2	Using, imitating	Applying under super-vision Exercising Trying out	Under direct supervision. With support from others, some autonomy, with my peers.	*Relying on support from others* Discover Explore	• I can explore new ways to make use of existing resources. • I can show that I am curious about new things.	• Alone and as part of a team, I can develop ideas that create value for others. • I can develop ideas that solve problems that are relevant to me and my surroundings.	• I can explore open-ended problems in many ways so as to generate multiple solutions. • I can approach open-ended problems (problems with many solutions) with curiosity.	• I can improve existing products, services and processes so that they better meet my needs or those of my peers and the community. • I can assemble objects that create value for me and others.	• I can describe how some innovations have transformed society. • I can find examples of innovative products, services and solutions.
1	Perceiving	Start	**Start**	**Start**	Start	Start	Start	Start	Start

6.1.3. Subcompetence 3: Visioning on the biochar based CCE

L	LEVEL5 Titles	LEVEL5 Hints	Entre-Comp Hints	Entre-Comp Titles	Imagine	Think strategically.	Guide action	
5	Developing, constructing, transferring	Strategy Versatility Incorporation	Contributing substantially Taking responsibility for contributing to complex developments in a specific field	*Driving transformation, innovation and growth*: Transform Expand	• I can show different audiences the benefits of my vision during turbulent times • I can develop (alone or with others) and compare different future scenarios.	• I can encourage enthusiasm and a sense of belonging around a convincing vision. • I can plan backwards from my vision to design the necessary strategy to achieve it.	• I can create (alone or with others) a 'roadmap' based on my vision for creating value. • I can identify challenges related to my (or my team's) vision, while respecting the	•

							different levels of the system and the variety of stakeholders affected.	
4	Discovering new contexts Developing Acting independently	Pro-Activity Applied knowledge Disturbed/ new contexts	Taking responsibility for making decisions and working with others. With some guidance and together with others.	*Taking responsibility* Reinforce Improve	• I can discuss my (or my team's) strategic vision for creating value. • I can use my understanding of the context to identify different strategic visions for creating value.	• I can prepare a vision statement for my (or my team's) value-creating activity that guides internal decision-making throughout the whole process of creating value. • I can explain the role of a vision statement for strategic planning.	• I can promote initiatives for change and transformation that contribute to my vision. • I can identify the changes needed to achieve my vision.	•
3	Deciding/ selecting	Theory knowledge Known/ prepared contexts	On my own and together with my peers. Taking and sharing some responsibilities.	*Building independence* Experiment Dare	• I can build future scenarios around my value-creating activity. • I can develop (alone or with others) an inspiring vision for the future that involves others.	• I am aware of what is needed to build a vision. • I can explain what a vision is and what purpose it serves	• I can decide what type of vision for creating value I would like to contribute to. • My vision for creating value drives me to make the effort to turn ideas into action.	•
2	Using, imitating	Applying under super-vision Exercising Trying out	Under direct supervision. With support from others, some autonomy, with my peers.	*Relying on support from others* Discover Explore	• I can develop simple future scenarios where value is created for my community and surroundings. • I can imagine a desirable future.	•	•	•
1	Perceiving	Start	**Start**	**Start**	Start	Start	Start	

6.1.4. Subcompetence 4: Valuing Ideas on the biochar based CCE

L	LEVEL5 Titles	LEVEL5 Hints	Entre-Comp Hints	Entre-Comp Titles	Recognise the value of ideas.	Share and protect ideas.		
5	Developing, constructing, transferring	Strategy Versatility Incorporation	Contributing substantially Taking responsibility for contributing to complex developments in a specific field	*Driving transformation, innovation and growth*: Transform Expand	• I can state the value of a new idea from different stakeholders' perspectives. • I can develop strategies to effectively make the most of opportunities to create value in my organisation or venture.	• I can develop a strategy on intellectual property rights that is tailored to the age of my portfolio. • I can develop a tailored strategy on intellectual property rights that deals with geographic requirements.	•	•
4	Discovering new contexts Developing Acting independently	Pro-Activity Applied knowledge Disturbed/ new contexts	Taking responsibility for making decisions and working with others. With some guidance and together with others.	*Taking responsibility* Reinforce Improve	• I can break down a value chain into its different parts and identify how value is added in each part. • I recognise the many forms of value that could be created through entrepreneurship, such as social, cultural or economic value.	• When creating ideas with others, I can outline a dissemination and exploitation agreement that benefits all partners involved. • I can tell the difference between trademarks, registered design rights, patents, geographical indications, trade secrets, confidentiality agreements and copyright licences, including open, public-domain licences such as creative commons	•	•
3	Deciding/ selecting	Theory knowledge Known/ prepared contexts	On my own and together with my peers. Taking and sharing some responsibilities.	*Building independence* Experiment Dare	• I can decide which type of value I want to act on and then choose the most appropriate pathway to do so. • I can tell the difference between social, cultural and economic value.	• I can choose the most appropriate licence for the purpose of sharing and protecting the value created by my ideas. • I can tell the difference between types of licences that can be used to share ideas and protect rights.	•	•

2	Using, imitating	Applying under su-per-vi-sion Exercis-ing Trying out	Under direct supervision. With support from others, some auton-omy, with my peers.	*Relying on support from others* Discover Explore	• I can show how different groups, such as firms and in-stitutions, create value in my community and surround-ings. • I can find examples of ideas that have value for myself and others.	• I can explain that ideas can be shared and circulated for the benefit of every-one or can be protected by certain rights, for example, copy-rights or patents. • I can clarify that other people's ideas can be used and acted on, while re-specting their rights.	•	•
1	Perceiving	Start	**Start**	**Start**	Start	Start		

6.1.5. Sub-competence 5: Ethical and sustainable thinking

L	LEVEL5 Ti-tles	LEVEL5 Hints	Entre-Comp Hints	Entre-Comp Ti-tles	Behave ethically	Think sustainably	Assess impact	Be accountable.
5	Developing, constructing, transferring	Strategy Versatil-ity Incorpo-ration	Contributing substantially Taking re-sponsibility for contrib-uting to com-plex develop-ments in a specific field	*Driving trans-formation, in-novation and growth*: Transform Expand	• I take action against unethical behav-iour. • I make it my priority to make sure that ethical behaviour is respected and promoted in my area of influ-ence.	• I can contribute to self-regulation discussions within my sector of oper-ations. • I can choose adequate methods for analysing environmental impact based on their advantages and dis-advantages.	• I can carry out impact assessment, impact monitoring, and impact eval-uation on my value-creating activity. • I can choose 'measure indicators' to monitor and assess the impact of my value-creating activity.	• I can design ways to be accountable to all of our stakeholders. • I can use the accountability methods that hold me responsible to our internal and external stakeholders.
4	Discovering new con-texts Developing Acting inde-pendently	Pro-Ac-tivity Applied knowledg e Dis-turbed/ new con-texts	Taking re-sponsibility for making decisions and working with others. With some guidance and together with others.	*Taking re-sponsibility* Reinforce Improve	• I can take responsibility for promot-ing ethical behaviour in my area of influence, (for example, by promot-ing gender balance highlighting ine-qualities and any lack of integrity) • I can argue that ideas for creating value should be supported by ethics and values relating to gender, equal-ity, fairness, social justice and envi-ronmental sustainability.	• I can discuss the relationship be-tween society and technical develop-ments, relating to their implications for the environ-ment. • I can discuss the impact an organisa-tion has on the environ-ment (and vice versa).	• I can define the purpose of the im-pact assessment, impact monitoring, and evaluation of impact. • I can analyse the implications of my value-creating activity within the boundaries of the system I am work-ing in.	• I can discuss a range of accountability methods for both functional and strate-gic accountability. • I can tell the difference between input, output, outcomes and impact.

3	Deciding/ selecting	Theory knowledge Known/ prepared contexts	On my own and together with my peers. Taking and sharing some responsibilities.	*Building independence* Experiment Dare	• I am driven by honesty and integrity when taking decisions. • I can apply ethical thinking to consumption and production processes.	• I can produce a clear problem statement when faced with practices that are not sustainable. • I can identify practices that are not sustainable and their implications for the environment.	• I can identify stakeholders who are affected by the change brought about by my (or my team's) value-creating activity, including stakeholders who cannot speak up (for example, future generations, climate or nature). • I can identify the impact that taking up opportunities will have on me and my team, on the target group and on the surrounding community.	• I can tell the difference between accounting for use of resources and accounting for the impact of my value-creating activity on stakeholders and the environment.
2	Using, imitating	Applying under super-vision Exercising Trying out	Under direct supervision. With support from others, some autonomy, with my peers.	*Relying on support from others* Discover Explore	• I can describe in my own words the importance of integrity and ethical values. • I can recognise behaviours that show integrity, honesty, responsibility, courage and commitment.	• I can recognise examples of environmentally friendly behaviour by companies that creates value for society as a whole. • I can list examples of environmentally friendly behav-iour that benefits a community.	• I can tell the difference between the impact of a value-creating activity on the target community and the broader impact on society. • I can find and list examples of changes caused by human action in social, cultural, envi-ronmental or economic contexts.	•
1	Perceiving	Start	**Start**	**Start**	Start	Start	Start	