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Active storage of captured CO_2 in net zero construction products

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D3.2. Educational materials for “Green Building” course

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Educational materials for “Green Building” course

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Subject	Public report presenting booklet with Educational materials for “Green Building” course in the form of presentations. Materials are designed to serve as a foundation for future workshops and professional training programmes and can be reused and adapted for different educational contexts and target groups.
Lead partner	UNIZG FCE
Main authors	Marijana Serdar, Ivana Carević, Nina Štirmer, Ivana Banjad Pečur
Main reviewers	Marijana Serdar
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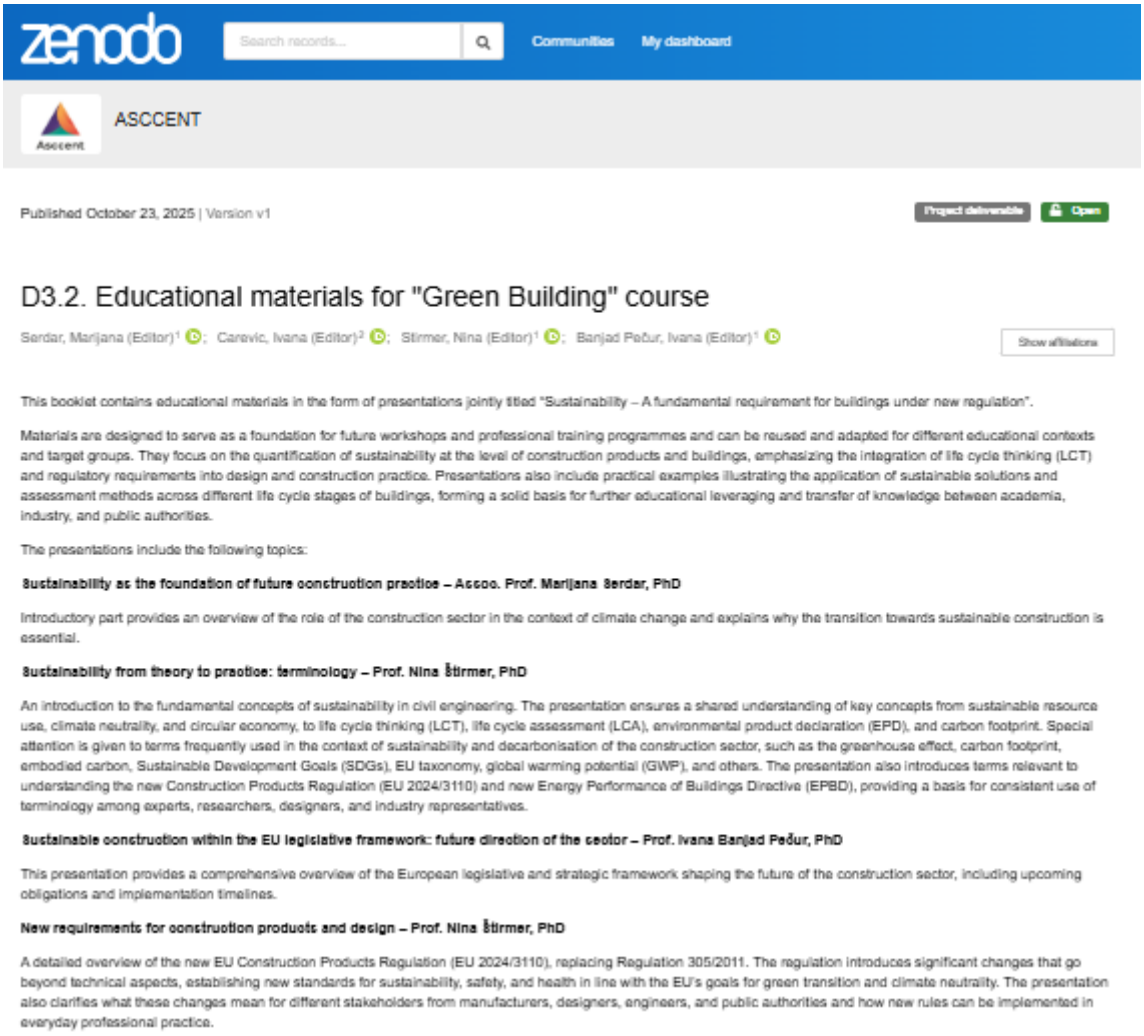
Contents

1 Introduction

This report presents booklet with Educational materials for “Green Building” course in the form of presentations jointly titled “Sustainability – A fundamental requirement for buildings under new regulation”.

To cover the workshop activities under Task 3.4 and to achieve KPI 2.7, training materials in the form of presentations (KPI 2.4) were developed. These materials include both theoretical and practical components and are tailored to different stakeholder groups doctoral candidates, professionals, representatives from the construction industry, and public authorities.

All materials have been publicly published on the Zenodo platform (https://doi.org/10.5281/zenodo.17424576) with DOI: 10.5281/zenodo.17424575 number.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D3.2. Educational materials for "Green Building" course

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This booklet contains educational materials in the form of presentations jointly titled "Sustainability – A fundamental requirement for buildings under new regulation".

Materials are designed to serve as a foundation for future workshops and professional training programmes and can be reused and adapted for different educational contexts and target groups. They focus on the quantification of sustainability at the level of construction products and buildings, emphasizing the integration of life cycle thinking (LCT) and regulatory requirements into design and construction practice. Presentations also include practical examples illustrating the application of sustainable solutions and assessment methods across different life cycle stages of buildings, forming a solid basis for further educational leveraging and transfer of knowledge between academia, industry, and public authorities.

The presentations include the following topics:

Sustainability as the foundation of future construction practice – Assoc. Prof. Marijana Serdar, PhD

Introductory part provides an overview of the role of the construction sector in the context of climate change and explains why the transition towards sustainable construction is essential.

Sustainability from theory to practice: terminology – Prof. Nina Štirmer, PhD

An introduction to the fundamental concepts of sustainability in civil engineering. The presentation ensures a shared understanding of key concepts from sustainable resource use, climate neutrality, and circular economy, to life cycle thinking (LCT), life cycle assessment (LCA), environmental product declaration (EPD), and carbon footprint. Special attention is given to terms frequently used in the context of sustainability and decarbonisation of the construction sector, such as the greenhouse effect, carbon footprint, embodied carbon, Sustainable Development Goals (SDGs), EU taxonomy, global warming potential (GWP), and others. The presentation also introduces terms relevant to understanding the new Construction Products Regulation (EU 2024/3110) and new Energy Performance of Buildings Directive (EPBD), providing a basis for consistent use of terminology among experts, researchers, designers, and industry representatives.

Sustainable construction within the EU legislative framework: future direction of the sector – Prof. Ivana Banjad Pečur, PhD

This presentation provides a comprehensive overview of the European legislative and strategic framework shaping the future of the construction sector, including upcoming obligations and implementation timelines.

New requirements for construction products and design – Prof. Nina Štirmer, PhD

A detailed overview of the new EU Construction Products Regulation (EU 2024/3110), replacing Regulation 305/2011. The regulation introduces significant changes that go beyond technical aspects, establishing new standards for sustainability, safety, and health in line with the EU's goals for green transition and climate neutrality. The presentation also clarifies what these changes mean for different stakeholders from manufacturers, designers, engineers, and public authorities and how new rules can be implemented in everyday professional practice.

Figure 1. Booklet with Educational materials for “Green Building” course publicly published on the Zenodo platform

Materials are designed to serve as a foundation for future workshops and professional training programmes and can be reused and adapted for different educational contexts and target groups. They focus on the quantification of sustainability at the level of construction products and buildings, emphasizing the integration of life cycle thinking (LCT) and regulatory requirements into design and

construction practice. Presentations also include practical examples illustrating the application of sustainable solutions and assessment methods across different life cycle stages of buildings, forming a solid basis for further educational leveraging and transfer of knowledge between academia, industry, and public authorities.

2 Educational materials for "Green Building" course

The presentations publicly published on the Zenodo platform include the following topics:

1. **Sustainability as the foundation of future construction practice** – Assoc. Prof. Marijana Serdar, PhD

Introductory part provides an overview of the role of the construction sector in the context of climate change and explains why the transition towards sustainable construction is essential.

2. **Sustainability from theory to practice: terminology** – Prof. Nina Štirmer, PhD

An introduction to the fundamental concepts of sustainability in civil engineering. The presentation ensures a shared understanding of key concepts from sustainable resource use, climate neutrality, and circular economy, to life cycle thinking (LCT), life cycle assessment (LCA), environmental product declaration (EPD), and carbon footprint. Special attention is given to terms frequently used in the context of sustainability and decarbonisation of the construction sector, such as the greenhouse effect, carbon footprint, embodied carbon, Sustainable Development Goals (SDGs), EU taxonomy, global warming potential (GWP), and others. The presentation also introduces terms relevant to understanding the new Construction Products Regulation (EU 2024/3110) and new Energy Performance of Buildings Directive (EPBD), providing a basis for consistent use of terminology among experts, researchers, designers, and industry representatives.

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5. **Principles of sustainability in design and material selection – Phase A** – Assoc. Prof. Marijana Serdar, PhD

This presentation addresses sustainable resource use and compliance with the 8th Basic Requirement for Construction Works during the design phase. It connects the legislative framework (EN 15643, Waste Status Regulation, CPR 2024) with practical guidance for designers and architects. Practical part

includes examples of how sustainability principles are applied through: (a) choice of construction technology (modular, prefabricated, adaptable design, and design for disassembly) and (b) material selection through urban mining, industrial symbiosis, and use of bio-based materials such as hemp, clay, and straw. Innovative and applicable examples for design practice are also presented.

6. **Principles of sustainability during operation and maintenance – Phase B** – Assoc. Prof. Marijana Serdar, PhD

Presentation covers use phase of buildings (Phase B) according to EN 15643, focusing on practical examples of sustainable maintenance, repair, and renovation. It explores energy and water use, greenhouse gas emissions, and environmental releases (e.g., VOCs, microplastics, radiation, radon), as well as durability considerations based on material properties. A case study of the renovation of Faculty of Civil Engineering building demonstrates the environmental impact through an LCA-based approach. Practical examples, such as proactive vs. reactive maintenance and the impact of renovation on emissions, illustrate how technical solutions contribute to long-term sustainability.

7. **Principles of sustainability at the end of life – Phases C and D** – Prof. Nina Štirmer, PhD

This presentation addresses sustainability during demolition, waste management, and material reuse, following the Waste Framework Directive (2008/98/EC) and the Croatian Waste Management Act (NN 84/2021). It focuses on the practical application of circular economy principles: selective demolition, on-site material sorting, logistics, waste traceability, recycling, and material reuse. Examples of good practice from Croatia and Netherlands are provided. Presentation emphasizes the end-of-waste criteria, legal obligations, and operational aspects of waste management, serving as a practical guide for engineers and professionals engaged in sustainable renovation and deconstruction.

8. **Evaluation of environmental impacts of buildings and construction products (LCA method)** – Asst. Prof. Ivana Carević, PhD

A comprehensive overview of the Life Cycle Assessment (LCA) methodology and its application in construction. Presentation explains the importance of quantifying the environmental impacts of materials and buildings to support resource efficiency and compliance with new regulations (CPR 2024 and EPBD). Special emphasis is placed on practical examples of using LCA in practice. This report presents the outcomes of the research mobility of Viktor Kolčić, a PhD researcher at the University of Zagreb Faculty of Civil Engineering (UNIZG FCE), who stayed at the KU Leuven in Belgium as part of the project's mobility programme in the period from 31 January 2025 till 3 February 2025. The mobility took place at KU Leuven's Department of Civil Engineering and Materials Science laboratories, which are internationally recognized for their expertise in cementitious materials, mineral carbonation, and sustainable construction technologies.

3 Main outcome

The booklet brings together a series of expert training materials in the form of presentations (KPI 2.4) that were publicly published on the Zenodo platform as part of Task 3.4 and to achieve KPI 2.7. The materials offer a comprehensive and structured overview of current knowledge, emerging regulations, and innovative practices in the field of sustainable construction and carbon reduction strategies.

The collected presentations collectively provide a multi-dimensional understanding of sustainability in the construction sector from theoretical foundations and legislative frameworks to practical applications and analytical methodologies. Participants gained an integrated perspective on how sustainability principles are embedded throughout the entire life cycle of construction products and buildings from design and material selection, through operation and maintenance, to end-of-life management and reuse.