D4.1

Training Materials

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New Skills for nearly Zero Energy Buildings

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Title: Report on Developed Training Materials for NS4nZEBs Training Course for Construction Specialists

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1. Executive Summary

This report presents an overview and evaluation of the training materials developed under the NS4nZEBs project for the upskilling of construction specialists in Nearly Zero Energy Buildings (nZEB). It outlines the goals, structure, methodology, and pedagogical value of the training content, along with quality assurance and potential impact.

2. Introduction

- **Purpose of the Report:**

The purpose of this report is to document and assess the developed training materials for training and/or upskilling professionals such as installers, engineers, architects, involved in the renovation and construction of energy-efficient buildings.

- **Context:**

The use of renewable energy and digital technologies in the building sector is heavily emphasized in the relevant EU Directives and regulations T, particularly the Energy Performance of Buildings Directive (EPBD).

- **Target Audience:**

The training under the NS4nZEBs aims to equip construction workers, installers, technicians, engineers, and architects, with the knowledge and skills required for the successful uptake of nZEBs.

- **Project Objectives:**

The main objective of the project is to provide structured, practical, and standards-aligned training in nZEB principles and applications.

The first task was to review, assess and identify the gaps in the skills of all specialists involved in nZEBs. The next step was to develop respective professional qualification profiles, focusing on what has to be improved and/or upskilled in order to tackle the skills mismatch identified in the surveys. The assessment of the needs of new skills of specialists in RES technologies in buildings show that the trainings should be adapted to the different levels of expertise of the trainees, as some of them need new skills, while other need only an up-skilling. Thus 9 competence profiles were identified: 1 for architects, 2 for HVAC engineers (new skills and

upskills), 2 for electrical and mechanical engineers, 2 for installers (new skills and upskills), and 2 for HVAC technicians (new skills and upskills). In addition, a training course for trainers was developed, focusing on the teaching methods, soft and digital skills, as well as on nZEB-specific aspects of the professional training.

3. Overview of the Training Programme

- **Structure:**

As the training will be on an e-learning platform, it was decided that it should have a modular design, 11 groups of modules, based on and further developing materials developed under previous projects – VET4GSEB, GSS-VET, etc. In addition, there will be a depository/library with additional materials on each topic, as well as case-studies. Each module finishes with a quiz, and there is a final test at the end of each course.

- **Duration:** as the training is flexible, the duration of each course varies from 35 to 75 hours, depending on whether it is for developing new skills or for upskilling.
- **Learning Levels:** From beginner awareness to expert-level application (EQF 4 to EQF 6+).
- **Outcomes:**

The training aims to equip trainees with knowledge of EU legislation, the nZEB concept, practical retrofit techniques, use of RES, application of smart energy systems, energy efficiency, energy communities, soft skills, working with clients, etc.

4. Description of Training Materials

4.1. Types of Materials Developed

- Presentation decks
- SCORM-compliant e-learning units - SCORM-compliant e-learning units are online training modules that adhere to the Shareable Content Object Reference Model (SCORM) standard, enabling them to be used across various Learning Management Systems (LMS) and ensuring interoperability, reusability, and traceable learner progress
- Videos, animations, and simulations
- Additional materials, case-studies and technical guides
- Quizzes and knowledge checks
- Trainer manuals and learner handbooks
- Feedback tool

4.2. Module Summaries

Module Title: - **Introduction**

Objective: - To acquaint the trainees with the NS4nZEBs project, as well as with the relevant EU legislation related to EE and RES.
Time Allocation: - 3 hours
Skills Addressed: - Regulatory compliance

Module Title: - **Understanding the integrated concept of NZEBs and Zero Emission Buildings, consisting of several sub-modules: Energy transition and the building's role; Energy efficiency – the building envelope; Solar technologies in buildings; Biomass; Urban planning and energy performance of buildings; Energy, sustainability and health impacts; Certification – voluntary certification schemes.**
Objective: - To acquaint the trainees with the concept of NS4nZEB and how it relates to the building's performance, envelope, the use of RES in buildings, health impacts, voluntary certification schemes
Time Allocation: - varies for each sub-module and also according to the professional profile.
Skills Addressed: - nZEB competence

Module Title: - **PV systems in buildings, consisting of the following sub-modules: PV systems in buildings (architects & engineers), PV systems – design parameters & performance (architects & engineers), PV systems – mounting & building integration**
Objective: - To acquaint the trainees with the PV systems in buildings
Time Allocation: - varies for each sub-module and also according to the professional profile.
Skills Addressed: - PV systems in buildings

Module Title: - **Heat pumps**
Objective: - To acquaint the trainees with heat pumps in buildings – types, installation requirements, design and installation.
Time Allocation: - varies according to the professional profile.
Skills Addressed: - Heat pumps in buildings

Module Title: - **Ventilation, consisting of 2 sub-modules: Ventilation – natural and mechanical; Smart ventilation**
Objective: - To acquaint the trainees with the principles, types and latest developments in ventilation.
Time Allocation: - varies according to the professional profile.
Skills Addressed: - Building ventilation

Module Title: - **Solar-thermal systems in buildings**
Objective: - To acquaint the trainees with the principles, types, design, installation and applications of solar-thermal systems in buildings
Time Allocation: - varies according to the professional profile.

Skills Addressed: - solar-thermal systems in buildings

Module Title: - **Storage systems**
Objective: - To acquaint the trainees with the principles, benefits and challenges of storage systems at building level; batteries.
Time Allocation: - varies according to the professional profile.
Skills Addressed: - storage at building level

Module Title: - **Energy management**
Objective: - To acquaint trainees with the fundamentals of energy management in the light of nZEBs.
Time Allocation: - 5 to 7 hours.
Skills Addressed: - energy management competence

Module Title: - **Energy communities: 4 sub-modules**
Objective: - To acquaint the trainees with the definition, benefits and challenges of energy communities; case studies and ways to set up an energy community
Time Allocation: - varies according to the professional profile.
Skills Addressed: - energy communities

Module Title: - **Entrepreneurship and working with clients: 2 sub-modules**
Objective: - To acquaint the trainees with the importance of developing entrepreneurship competence and the ability to work with clients. Case-studies, practical tasks.
Time Allocation: - 7 to 10 hours.
Skills Addressed: - entrepreneurship competence and interpersonal skills

Module Title: - **Soft skills – emotional intelligence & problem-solving**
Objective: - To boost the emotional intelligence, decision-making and problem-solving skills of the trainees.
Time Allocation: - 5 to 7 hours.
Skills Addressed: - soft skills competence

Module Title: - **Digital skills – 2 modules: Digital skills; Digital skills – CAD & BIM (for architects & engineers)**
Objective: - To boost the digital skills of trainees.
Time Allocation: - 5 to 7 hours.
Skills Addressed: - digital skills competence

5. Pedagogical Approach

- **Competence-Based Design:** Based on EQF, ESCO, GreenComp.

CBL emphasizes the mastery of specific, job-relevant skills. Learners progress upon demonstrating proficiency, making this ideal for practical roles in construction. When the training is based on EQF, ESCO and GreenComp, trainees will acquire recognizable, measurable competences.

- **Practical Learning:** The NS4nZEBs training emphasis on real-world application, case-studies, site scenarios, and digital tools to simulate practical situations.
- **Learning Methods:** Problem-based learning, microlearning, blended learning, self-paced modules. Learners are placed in realistic job scenarios where they make decisions and see the consequences. This mirrors on-site decision-making and reinforces knowledge in context. Microlearning delivers short, focused lessons (typically 5–10 minutes) that are easier to digest and retain. This method suits mobile workers who may only have brief periods to engage with content.

- **Inclusivity:** Designed to be accessible and engaging for diverse learners, because it:
    - Supports diverse learners, including those in rural or remote areas.
    - Can accommodate different languages, literacy levels, and learning formats (e.g., visual/audio-based).

6. Quality Assurance and Validation

- **Internal Review:** The training content is reviewed by instructional designers and subject matter experts. Their feedback is reflected in the revised content.
- **External Validation:** Pilot reviews from industry professionals and trainers. This will happen immediately prior to and during the pilot 'Train the trainer'
- **Standards Compliance:** The training is aligned with EQF levels and national nZEB training requirements.
- **Feedback Loops:** A feedback tool kit is being developed, so as to integrate the feedback into content refinement, and also in the trainer action plan.

7. Pilot Testing and Feedback

- **Participants:**
- **Participants:**

The materials are being reviewed by the QAC (quality assurance committee) and the MCB (methodological compliance board), whose members are experts from the partner organizations,

and then they will be tested in the pilot training 'Train the trainer', which will be conducted in two stages: one – online (on the e-learning platform) and the second – in person /or on a video platform in real time. The purpose of the second stage is for trainees to share experiences and provide feedback which will be reflected in the training content afterwards.

Eligibility criteria for the trainers to be included in the Pilot training:

- 5+ years experience in sector,
- teaching/mentorship skills, English,
- certified qualifications/area-specific

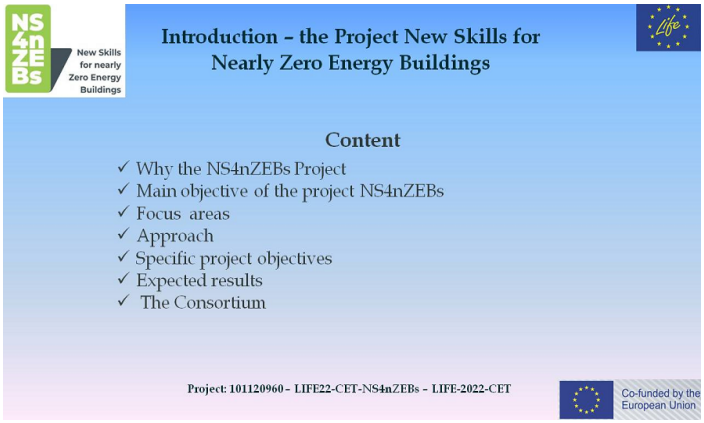
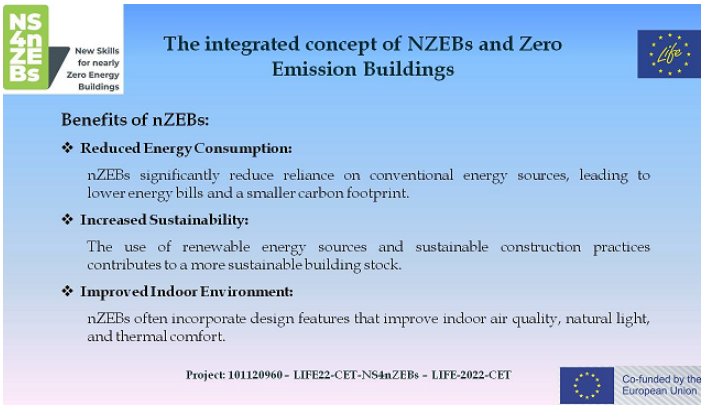
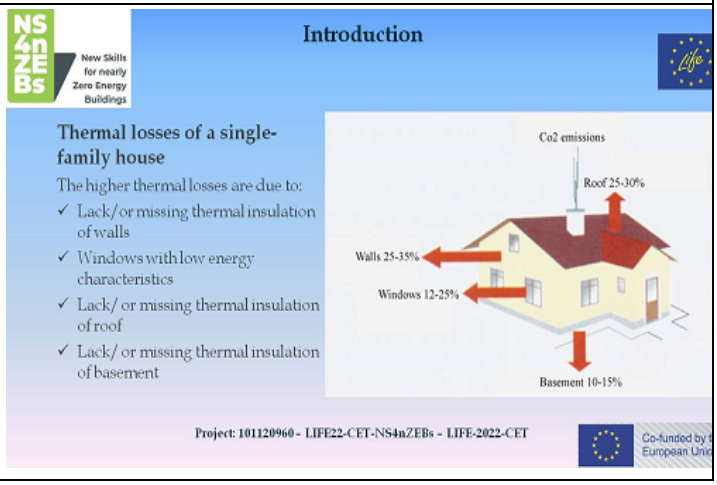
- **Methods of Evaluation:** The training course (structure, content, delivery, results) shall be evaluated through satisfaction assessment forms incorporated in the e-learning platform, surveys, interviews, platform analytics
- **Key Feedback Themes:** The main feedback themes are: content usability, relevance, clarity, interactivity, delivery.
- **Revisions Made:** Changes based on feedback by the experts are being made. Further changes will be made after the pilot training and reflected in the training content and trainers' Action plan.

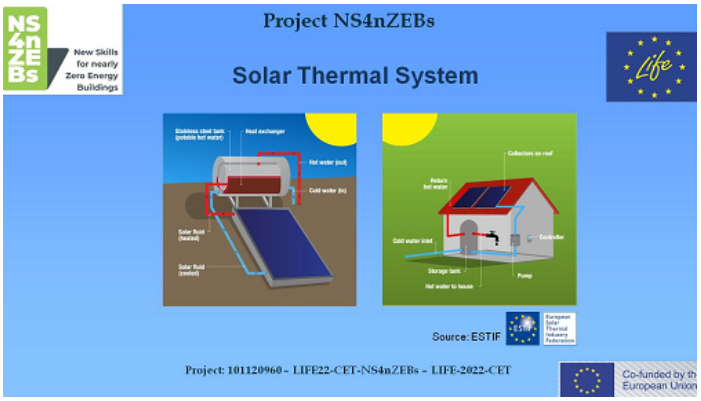
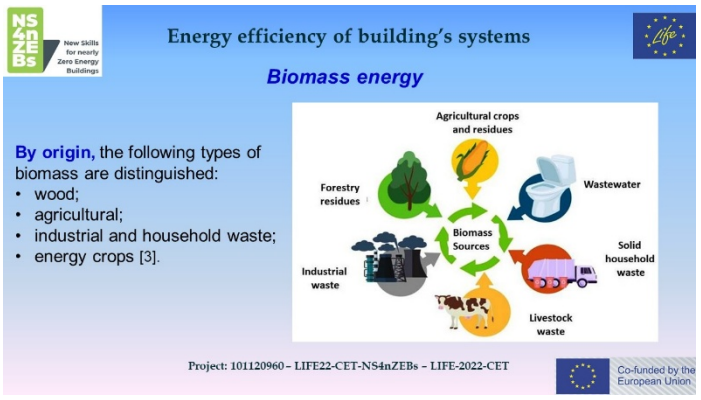
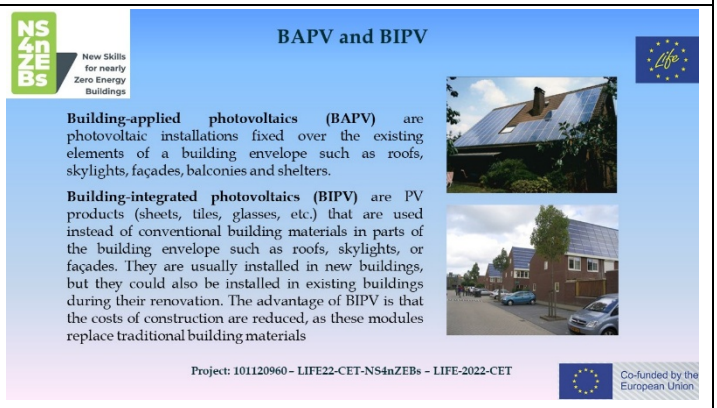
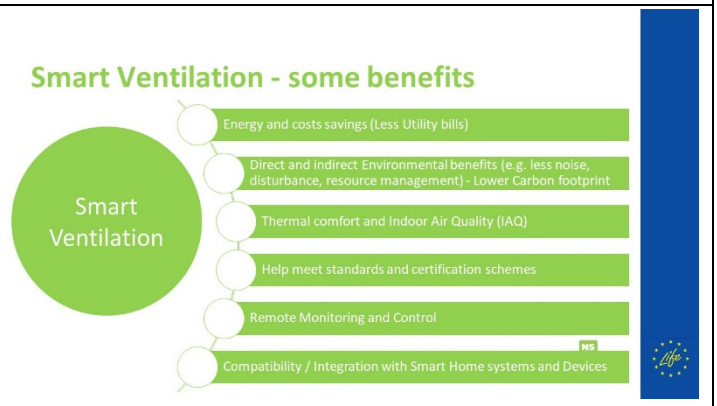
8. Evaluation and Impact Potential

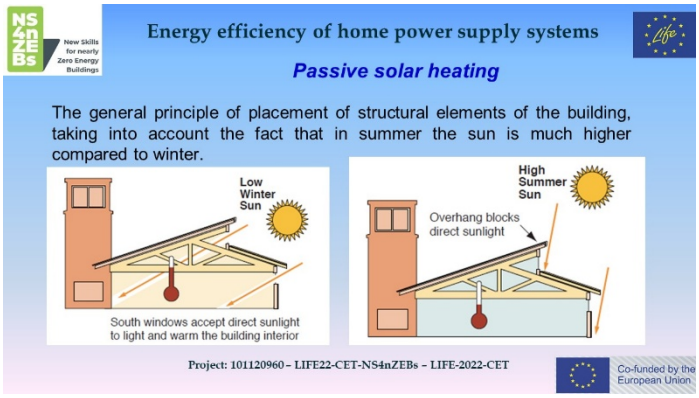
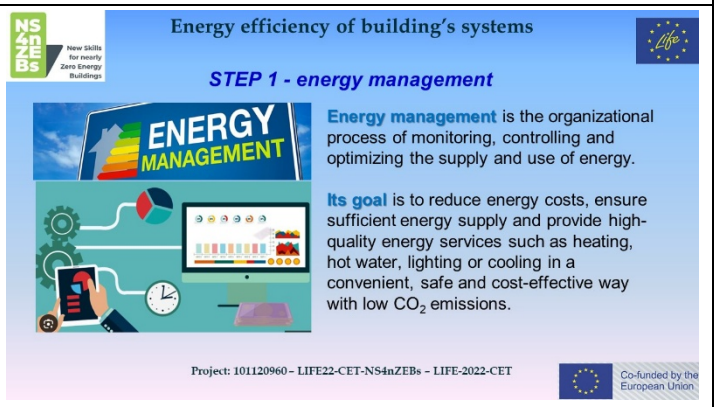
- **Readiness for Implementation:** The training materials are ready. They are currently being revised by our experts, QMC and MCB, before being uploaded onto the platform.
- **Alignment with Learning Objectives:** We believe the designed training will be effective in meeting the set targets, that is, in upskilling construction specialists for nZEB.
- **Scalability and Transferability:** Because it has been developed by partners from different parts of Europe, we consider it adaptable across EU regions and training contexts
- **Support for CPD and Certification:** Modular structure supports continuing education. We have also developed a certification scheme. After the successful completion of a module (training content and quiz), each trainee will receive a digital certificate showing the acquired competence. Upon successful completion of the course, trainees will be awarded a Europass Certificate Supplement detailing the material covered, knowledge and skills gained.

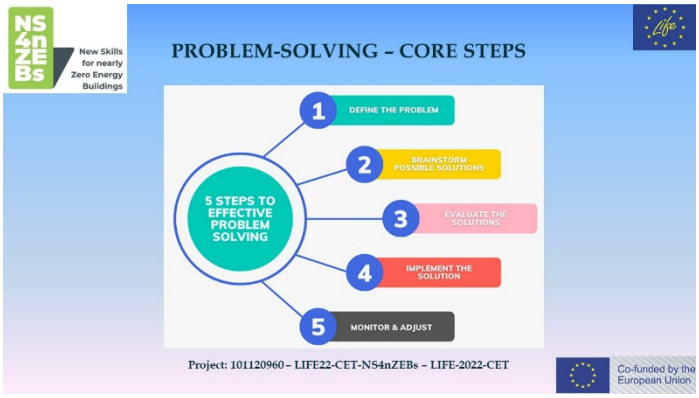
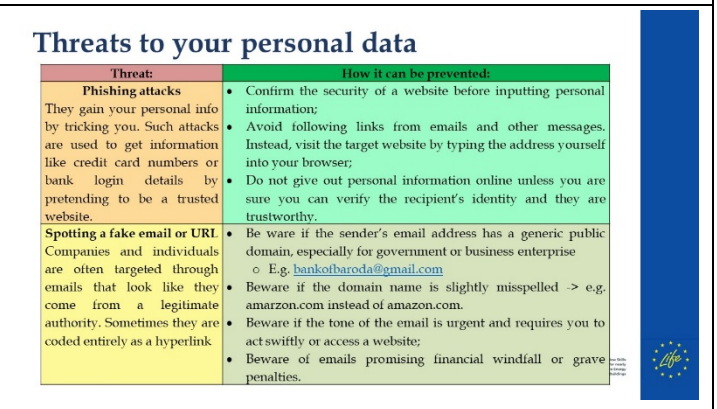
9. Annexes

- **A. Training Module List & screenshots**

Module - Title	Screenshot
Module: Introduction	
Module: Understanding the integrated concept of NZEBs and Zero Emission Buildings, consisting of several sub-modules: Energy transition and the building's role	
Module: Understanding the integrated concept of NZEBs and Zero Emission Buildings - Energy efficiency – the building envelope;	

Understanding the integrated concept of NZEBs and Zero Emission Buildings - Solar technologies in buildings;	
Module: Understanding the integrated concept of NZEBs and Zero Emission Buildings - Biomass	
Module: PV systems in buildings	
Module: Ventilation	

Module: Solar systems in buildings	
Module: Energy management	
Module: Energy Communities	
Module: Entrepreneurship & Working with clients	

Module: Soft skills	
Module: Digital skills	

- **B. Feedback Forms**

We have included the following questions in our satisfaction assessment survey:

1. What training have you taken?
2. Are you satisfied with the quality of the training you received? *(opinion scale)*
3. How relevant and adapted was the training content to your professional needs? *(opinion scale)*
4. Did the training effectively cover the topics that were advertised? *(Yes/No)*
5. Was the training well-organized and easy to follow? *(Yes/No)*
6. Did the content and the trainer (in the real-time video sessions) effectively engage the trainees and facilitate learning? *(Yes/No)*
7. How much did you learn during the training? *(opinion scale)*
8. How well do you feel you retained the information from the training? *(star rating)*
9. How confident do you feel in applying what you learned from the training to your job? *(opinion scale)*
10. Did the training provide you with the skills and knowledge you need to perform your job more effectively? *(long text)*
11. Was the training delivery method effective for your learning style? *(Yes/No)*
12. Did the training materials effectively supplement the training content? *(Single selection)*

13 Was the training platform easy to use and conducive to learning? *(Yes/No)*

14 How helpful were the pre-training resources (in the 'library') in reinforcing the training content? *(opinion scale)*

15 Did the training address any specific challenges or issues that you have been facing in your job? *(Long text)*

16 Did the training provide opportunities for application of the concepts learned? *(short text)*

17 Were the training objectives clearly defined and aligned with your learning needs? *(Yes/No)*

18 Were you provided timely and helpful feedback during the training? *(Yes/No)*

19 Do you think you will use the newly acquired knowledge and skills in your everyday work? *(Yes/No)*

20 Was the training content level appropriate for the audience? *(Yes/No)*

21 Did the trainer effectively address questions and concerns raised by the audience in the forums and online real-time sessions? *(Long text)*

22 Were the training materials visually appealing and easy to read? *(Yes/No)*

23 Was the training length appropriate for the content being covered? *(Yes/No)*

24 Did the training provide opportunities for networking and collaboration with colleagues? *(Yes/No)*

25 Would you recommend this training to a colleague? *(Yes/No)*

26 Is there anything that could be improved about the training content or the training delivery? / What aspects of this training would you suggest need improvement? *(open-ended question)*

C. Trainer's Feedback Action Plan

Feedback Action Plan		
Date:	**Most significant feedback comments:**	**What these really mean: (e.g. after asking the lecturers, or after discussing with other students, or after reflecting further on the work and the feedback**
1		
2		
3		

Extent to which I *agree* with the feedback	**Positive:**	**Critical:**
	Things I did which attracted positive feedback:	**Things I did which attracted critical feedback:**
1		
2		
3		
Notes about any recurring trends in the feedback I am receiving		

	Things I can do to build on the positive feedback in my future work:	**Things I can do to address the critical feedback in my future work:**
1		
2		
3		
Additional feedback	**Further positive feedback I've obtained on this work from other people**	**Further critical feedback I've obtained on this work from other people**

Source 1:		
Source 2:		
Source 3:		
The single most important thing for me to *keep doing* in my future work on the basis of this feedback:		
The single most important thing for me to *improve* in my future work on the basis of this feedback:		

D. Links to Digital Content – *https://moodle.nisbg.org/course/index.php?categoryid=8*