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Guidelines for the Organization and Performance of Training Courses under the NS4nZEBs Project

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NS4nZEBs New Skills for nearly Zero Energy Buildings

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Guidelines for the Organization and Performance of Training Courses under the NS4nZEBs Project

Executive Summary

The Guidelines for the Organization and Performance of Training Courses under the NS4nZEBs Project provide a comprehensive framework for designing, delivering, and evaluating training programs aimed at upskilling construction professionals in line with Nearly Zero Energy Building (nZEB) requirements.

The Guidelines support training providers, trainers, partner organizations, and stakeholders by offering practical instructions to ensure high-quality, inclusive, and standardized training aligned with EU and national regulations.

Key Elements of the Training Framework:
- *Objectives & Target Groups*: The training focuses on upskilling installers, technicians, engineers, architects, energy managers, and supervisors to deliver sustainable, nZEB-compliant buildings.
- *Structure & Modality:* Using an Enriched Virtual Model, the training integrates flexible e-learning modules with interactive content, supported by live online sessions and practical case studies.
- *Admission & Recruitment*: Trainers require proven expertise and pedagogical skills, while trainees must hold relevant professional qualifications. The program emphasizes inclusivity, prioritizing women, minorities, migrants, and persons with disabilities.

Methodology & Implementation:
- Pedagogical principles prioritize learner-centered, problem-solving approaches that connect theory with practice.
- Digital tools (videos, interactive presentations, serious games) and communication platforms (Zoom, Google Classroom) foster engagement and peer learning.
- Courses follow a structured cycle: opening session, modular learning with quizzes, live discussions, and closing reflections.

Quality Assurance & Certification:
- Monitoring is ensured through platform analytics, quizzes, and feedback surveys.
- Successful participants receive certificates aligned with national and EU standards, including Europass Certificate Supplements.

Trainer Support & Sustainability:
- A train-the-trainer model builds a pool of qualified experts across partner countries.
- Continuous professional development and exchange of best practices ensure trainers remain current with evolving standards and technologies.
- Sustainability is promoted through alumni networks, renovation hubs, and ongoing updates to training content.

Overall, the Guidelines establish a robust, inclusive, and future-oriented training model that not only addresses the technical and digital needs of the construction sector but also fosters innovation, accessibility, and long-term impact in advancing nZEB practices across Europe.

1. Introduction

The NS4nZEBs project aims to enhance the skills and knowledge of construction professionals to meet the requirements of Nearly Zero Energy Buildings (nZEBs). These Guidelines provide practical instructions for the organization, delivery, and quality assurance of training courses under the project.

The Guidelines are intended for:

- Training providers and coordinators,
- Trainers and facilitators,
- Partner organizations,
- Stakeholders engaged in capacity-building in the construction sector.

Their purpose is to ensure that all training activities are consistent, effective, and aligned with EU and national standards, while also fostering innovation, inclusivity, and sustainability in training practices.

2. Framework of the Training Courses

NS4nZEBs Training Concept: The courses aim to upskill specialists in the construction sector to deliver buildings that comply with nZEB requirements. The training integrates knowledge of nZEB-related EU and national legislation, technical knowledge, digital competences, and interpersonal skills to prepare professionals for the future of sustainable construction. In addition, its purpose is also to prepare trainers able to deliver and facilitate successfully the national NS4nZEBs courses in the partner countries.

Target Groups: The following specialists fall onto the category of Target trainers and trainees: Installers and technicians, Engineers (civil, HVAC, electrical, mechanical), Architects and designers, Energy managers, Construction supervisors and project managers.

Modalities of Training: The applied training model is the Enriched virtual model adopted for the courses. It combines E-learning modules (flexible online learning with interactive content on a dedicated e-learning platform), and Face-to-face sessions (virtually, through Zoom, Teams or similar platform).

Duration and Structure: Training modules are modular and can be combined into effective short upskilling courses. In accordance with the developed curricula (D3.2), each module has defined learning outcomes, assessment methods, and workload (expressed in learning hours), although the Enriched virtual model, adopted by the project allows every trainee to study in their own free time, whenever and wherever they can.

3. Organizational Aspects

Roles and Responsibilities:

Training providers – ensure coordination of the training courses, they recruit trainers and trainees and make sure the respective applicants meet the requirements for the training (see below). In addition, they should liaise with stakeholders from the industry to promote the training courses and to obtain from the stakeholders feedback and updates on the latest developments as well as real-life examples to be included in the training.

Trainers - their main task is to deliver and above all to monitor the courses. They mainly have the functions of facilitators, that is they provide support to the trainees in the Forum, and conduct the respective Zoom (Teams, etc.) sessions.
What is expected from them in the Zoom sessions?
They should basically conduct Q&A sessions in their respective fields.
They may also involve trainees in other activities.

E.g. EU and national legislation:

- Learning outcomes: Understand key EU directives
- Topics: EPBD, Fit for 55, Renovation Wave
- Suggested activity: Policy mapping exercise

E.g. RES in buildings:

- Topics: PV, Solar-thermal, Biomass
- Activity: Design a retrofit
- Case-study: Successful RES integration

Support staff – they are mainly entrusted with administrative tasks, such as compiling trainees' dossiers (CVs, copies of diplomas, etc., copies of the certificate awarded to them, etc. in accordance with the national requirement). They also have to make sure the e-learning platform is functioning properly, and provide assistance and support to trainees who have problems using it. In addition, they should technically organize the Zoom sessions.

Admission criteria for trainers:

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

Objectives: The training courses aim to qualify and/or upskill so as to make nZEB-ready the specialists in the 5 main courses developed to meet the needs of the 9 professional profiles: architects (upskills), HVAC engineers (new skills and upskills), electrical engineers (new skills and upskills), HVAC technicians (new skills and upskills), installers & electricians (new skills and upskills). In the first round of national training courses, 360 trainees will be trained. The project also aims to achieve sustainability by continuing to provide the developed courses and regularly updating the training content.

Recruitment of Participants:

All partners should promote the national trainings through their websites, social media channels, as well as through the seminars and round tables envisaged in the Project.

Eligibility and admission criteria:

All trainees should have **certified qualifications** in the respective field.

There should be NO discrimination. The online learning platform offers flexibility and inclusivity. Therefore, women, specialists with disabilities, members of minority groups, migrants, should be targeted through special campaigns and contacts with their respective organizations, and given priority.

Infrastructure and Tools: User-friendly online platform There is a dedicated e-learning platform (https://moodle.nisbg.org/my/courses.php) , which is a fully-featured LMS, access to digital tools and other platforms for video meetings (Zoom, Google meet, Teams, etc.)

When enrolling a trainee, the Training provider sends them user names and passwords, as well as the 'Guide to the platform', where there are detailed instructions on how to access the platform. Screenshots from the Guide to the platform are provided here as Annex 1.

4. Training Methodology

Pedagogical Principles: Learner-centered, problem-solving, linking theory with practice.

The ubiquitous model is used, delivered on an e-learning platform, which provides flexibility in learning, with the teacher acting as a guide or facilitator.

On the Project NS4nZEBs, different digital technologies, such as videos, screencasts, interactive presentations and quizzes, as well as 'serious games' are integrated. Additionally, to realize the communication and interaction between trainees and with the trainers, too, Zoom or Google Classroom are used.

The training meets the identified criteria and will be a really successful one, as it will be:

- Technically robust and practically focused
- Learner-centered and digitally enabled
- Context-aware and outcomes-driven
- Sustainable, certifiable, and transferable

Integration of Digital and Soft Skills: There are two modules on Digital Skills & AI: Digital Skills and Digital Skills: CAD & BIM, Modules on Soft Skills: Soft Skills, Entrepreneurship & Working with Clients, Financial & Organizational Issues, which are aimed at developing skills, such as emotional intelligence, teamwork, client communication, energy modelling.

Inclusivity and Accessibility: As it is online and flexible, the training is accessible for all learners, including those with special needs.

5. Implementation of the Training

Course Delivery Steps:

Opening session – it is recommended that the courses should start with a Zoom (team, Google meet, etc.) session organized by the training provider, with a brief introduction to the course, the platform and the whole concept.

Module delivery: all the modules are in the form of interactive presentations accessible via any kind of mobile device (phone, tablet) and computer.

In addition, there is a 'Library' section to each module group, where trainees can find downloadable pdf versions of the modules, useful articles and case-studies.

After each module group, there should be a Zoom session with the Trainer so that trainees have the chance to discuss any issues or questions they may have. Also in the Zoom session, the Trainer presents case-studies and discusses them with the trainees. For this purpose, trainers are encouraged to prepare their own portfolio of real-life examples and materials on the latest developments.

Following the Zoom session, trainees have to **do the quiz** for the respective module group. Each trainer is allowed 3 attempts and needs a score of =<60% to pass the quiz. **Upon the successful completion of all quizzes**, each trainee is automatically awarded a Europass Certificate Supplement detailing the acquired competences.

Closing session: Training providers are encouraged to organize a closing session during which to discuss the learning experience of the trainees and their overall evaluation of the course.

At the end of each course, there is a **Course Satisfaction Assessment Survey**, which trainees should fill in so as for the Training provider to have feedback on the course, training content, appropriateness, usefulness, delivery, etc. The results from the survey should be summed up by the Training provider and reflected in the Trainer's Action Plan (Annex 2)

Time Management: As the training is entirely online, trainees have the opportunity to study whenever and wherever they can. Nevertheless, it is useful to set realistic deadlines for the Module face-to-face virtual sessions.

Engaging Adult Learners: Trainers should use real-life scenarios, and encourage peer learning, reflection and experience sharing.

6. Quality Assurance

Standards: The quality of the training is ensured by the quality of the training material, the quality of the structure of the materials, and qualified trainers.

Monitoring: The training courses are monitored through the attendance tracking through the platform analytics, knowledge checks (quizzes), and the course satisfaction assessment survey.

Feedback: Feedback (both from the Closing session and the Course Satisfaction Assessment Tool) should be collected systematically and reflected both in the training content and the trainers' action plan.

7. Assessment and Certification

Assessment Methods: The progress of the trainees and the extent to which they have mastered the knowledge and skills are assessed by means of the Quizzes integrated in the platform.

Certification: UponCertificate of completion aligned with NS4nZEBs standards, recognized nationally and at EU level – Digital Certificate for the Trainers and Europass Certificate Supplement for the trainees. **Upon the successful completion of all quizzes**, each trainee is automatically awarded a Europass Certificate Supplement detailing the acquired competences.

8. Trainer Support and Development

Trainer Qualifications: Trainers are selected on the basis of their technical expertise and

pedagogical/mentoring competence. All trainers must have completed successfully the 'Train the trainer' course, and the detailed course for their professional profile.

Train-the-Trainer Approach: The aim of the project is to build a pool of qualified trainers across partner countries.

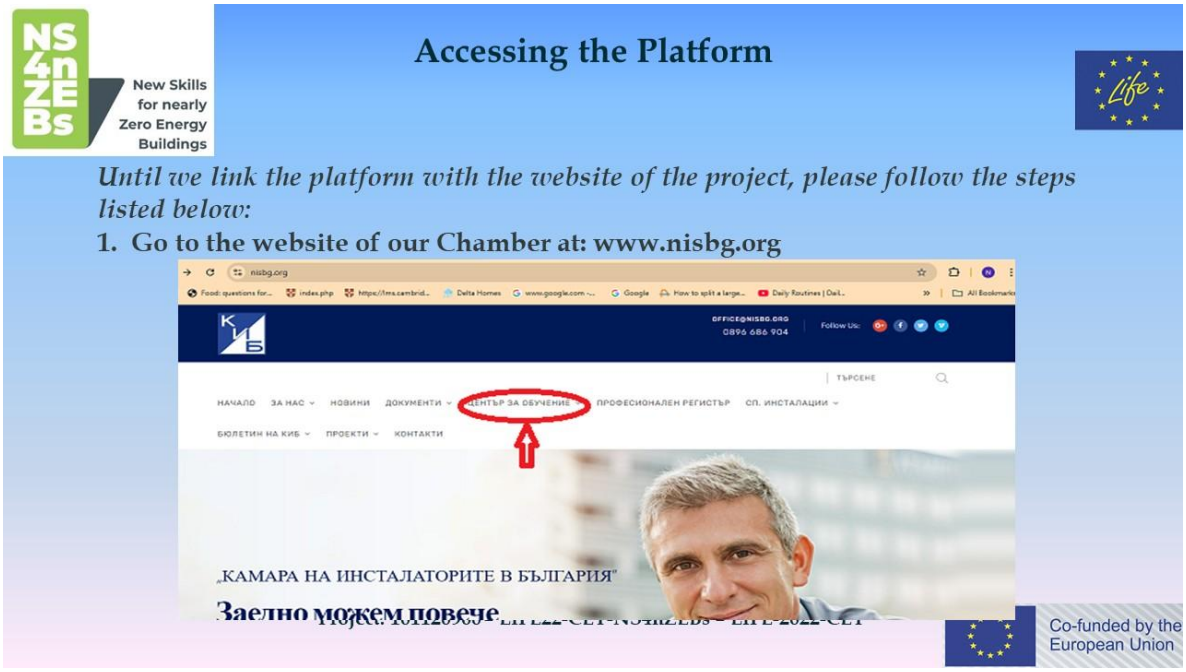
Continuous Development: The training courses strive to ensure continuous professional development of the target trainees, as well as to equip them with best practice exchange, and regular updates on regulation and technology.

9. Sustainability and Follow-Up

Sustainability will be achieved by multiplication of the training courses in the partner countries and regularly updating the course content, by creating alumni networks, by providing continuous learning resources, and establishing links with renovation hubs.

10. Annexes

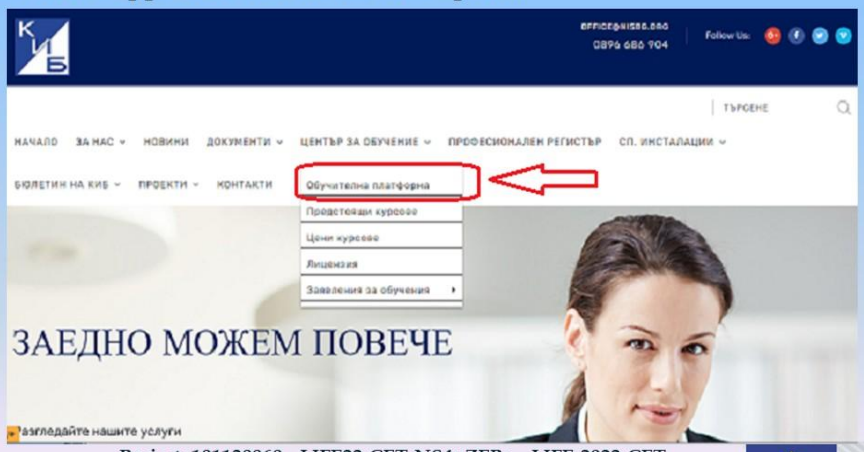
Annex 1: Screenshots from the Guide to the Platform



New Skills for nearly Zero Energy Buildings

Accessing the Platform

2. When you click as shown on the previous slide, a drop-down menu appears. Click on the first option.



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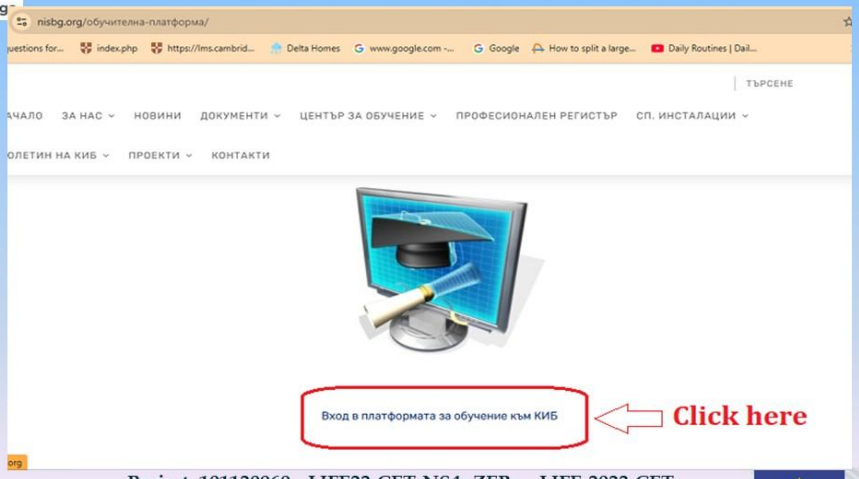
New Skills for nearly Zero Energy Building

Accessing the Platform

3. One more step to go to the home page of the platform



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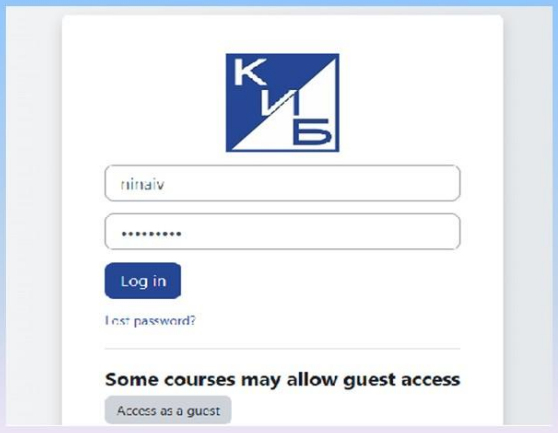
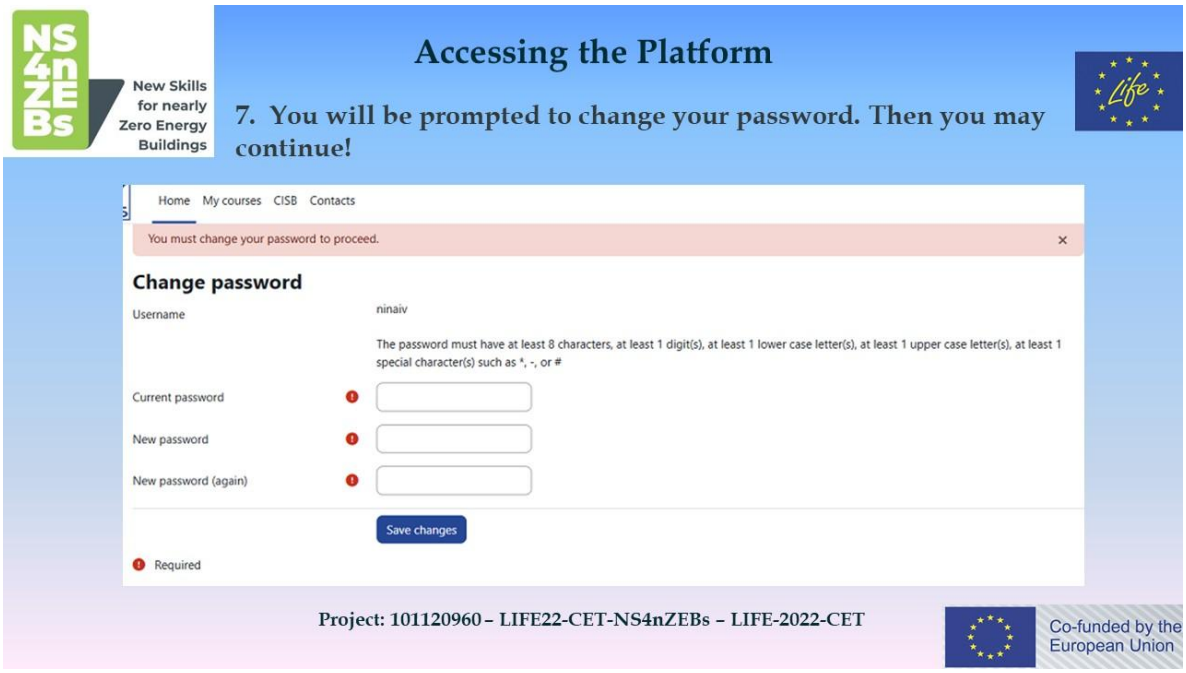
Accessing the Platform

4. This is the home page of the platform. Click on the NS4nZEBs course.

Accessing the Platform

6. You will be asked to log in (use the credentials I sent you – email address and password).





Annex 2: Feedback form and Action plan.

The **impact** and **efficacy** of a **training programme** are evaluated using a training effectiveness survey. It is given to participants after the training is concluded and is intended to collect feedback on a variety of components of the **training experience**, including the subject matter, method of delivery, tools, and general efficacy.

An evaluation of the training program's strengths and weaknesses is performed in order to **make modifications** and increase the efficacy of the next training sessions. Organizations may better evaluate the effects of their training programs and make wise decisions about how to spend resources, and create future **training sessions** by asking participants for candid and **constructive feedback**.

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)*

As we pointed out in Section 6. Quality Assurance, no feedback is effective if it is not picked up, read and acted on. For this purpose, we have provided also a sample Feedback Action Plan below.

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:		

Annex 2: Case Studies (summaries of good practices).

PV Systems in nZEB / NZE Buildings — Bulgaria & Selected EU Cases

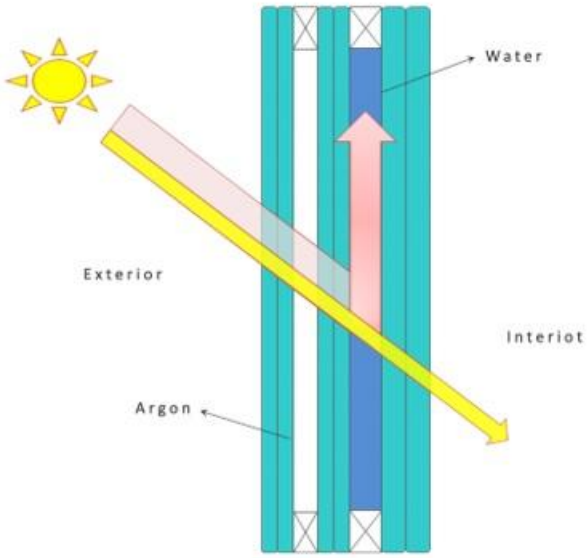
This document compiles real-life examples of photovoltaic (PV) systems integrated into Nearly Zero-Energy Buildings (nZEB), Positive Energy Buildings (PEB), and demonstration projects across Bulgaria, Greece, Italy, Spain, Belgium and Ukraine. Each case includes key technical data (where available), project context, lessons learned and references for further reading.

Bulgaria — Case Studies

Demonstrational Pavilion – Sofia

Research demonstrator with water-flow glazing (WFG) façade, roof-mounted PV and heat pump.
PV / Storage specs: 4.8 kWp (roof PV)
Key takeaway: Monitoring data collected; small-scale demonstrator; useful for BIPV and envelope+PV lessons.
Reference: MDPI: Energy (water-flow glazing study)

InDeWaG Demonstrational Pavilion in Sofia, Bulgaria



Principal concept of operation of water flow glazing

PV-ESTIA Residential Pilots – Plovdiv

Five residential PV+storage pilots installed by Energy Agency of Plovdiv under PV-ESTIA.
PV / Storage specs: 5 × 2.7 kWp (13.5 kWp total); 5 × 9.6 kWh batteries (48 kWh total)
Key takeaway: Standardized prosumer systems; monitoring and energy management; ideal for sizing/self-consumption exercises.
Reference: PV-ESTIA project materials

POWERTY Pilots – Social Buildings, Plovdiv

Rooftop PV + battery installations in social/public buildings to reduce energy poverty.
PV / Storage specs: 2 × 10 kWp; 1 × 5.8 kWp; Batteries: 2 × 34 kWh; 1 × 12 kWh
Key takeaway: Public sector implementation, measured yields and exported surplus.
Reference: POWERTY project reports

Municipal Administration Transformation – Plovdiv

Techno-economic study modeling retrofit + PV to transform a municipal office into a Positive Energy Building.
PV / Storage specs: Scenario: PV could cover up to ~80% of electricity demand (modelled); Investment ≈ €2.82M
Key takeaway: Good for ROI/cost-benefit training; shows combined measures.
Reference: Techno-economic study (Plovdiv)

Other European Cases (Greece, Italy, Spain, Belgium, Ukraine)

Alexandroupolis Positive Energy Community – Greece

Feasibility and replication study for near-zero/positive energy community; houses oriented south with rooftop PV + battery storage.
PV / Storage specs: Community-scale: ~500–550 kWp required for the community (modelled/estimated)
Key takeaway: Neighborhood-scale PV + storage; useful for community energy planning, shared resources and roof-area limitations.
Reference: MDPI and project papers on Alexandroupolis (positive energy community feasibility)

Calolziocorte Sports Gymnasium – Italy

Design study of a nearly zero energy sports gymnasium with integrated sustainability techniques (envelope, PV, HVAC).

PV / Storage specs: PV included in design (capacity modelled; specific kWp varies by scenario)

Key takeaway: Good for design-integration exercises in Mediterranean/temperate climates; emphasises integrated design and simulation.

Reference: MDPI / ResearchGate case study (Calolziocorte)

LUCIA Zero-Carbon Building – Valladolid, Spain

University building designed as near-zero and near-zero carbon; uses PV, biomass, earth-air heat exchanger and CHP to meet needs.

PV / Storage specs: PV systems part of integrated renewables; combined system for electricity/heating/cooling (specific PV kWp present in project reports).

Key takeaway: Example of hybrid renewable systems and research-grade monitoring; high LEED certification and measured performance.
Reference: Energy journal / LUCIA case study (Valladolid)

Nearly-nZEB Single-Family House – Belgium (East Belgium study)
Modelled nearly zero energy single-family house; integrated PV and natural ventilation strategies studied.
PV / Storage specs: PV modelled per scenario (kWp varies); study focuses on energy performance and overheating risks.
Key takeaway: Shows northern/temperate climate NZEB considerations and design trade-offs.
Reference: MDPI case study of Belgium single-family house

Ukraine — nZEB/NZEB Guidance & Modelling (Dnipro / national studies)
Research and guidance materials exploring NZEB definitions and pilot modelling for Ukrainian climate; includes case studies (e.g., Dnipro).
PV / Storage specs: Modelled examples with specific energy consumption targets; PV potential assessed in national reports (kWp depends on scenario).
Key takeaway: Useful for understanding how NZEB principles transfer to Eastern European climates and for emergency/reconstruction planning.
Reference: VTT report and Dnipro triple net-zero studies

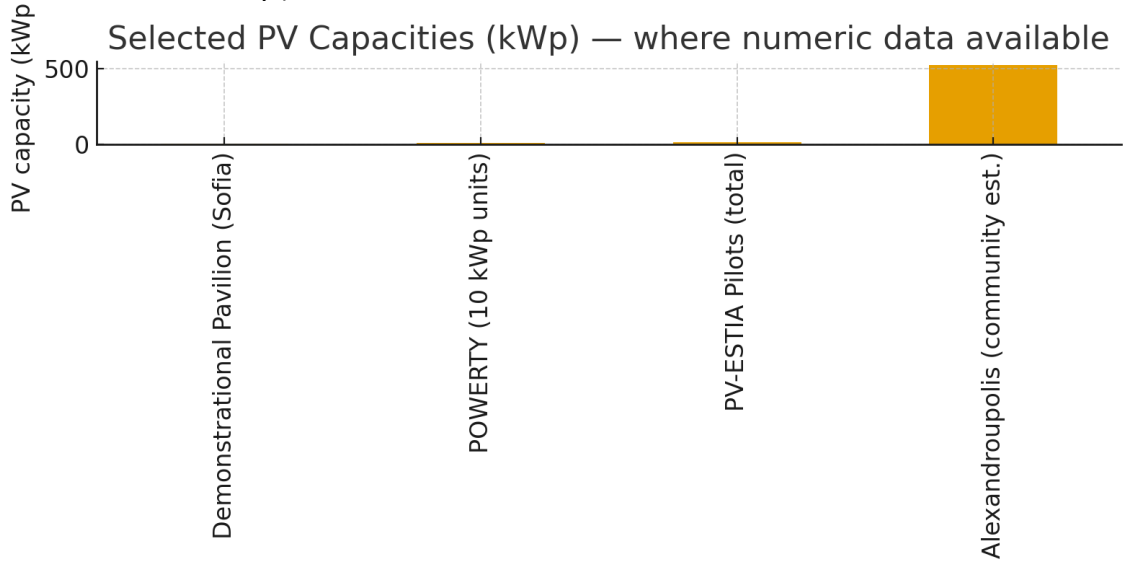
Comparative Technical Table

Case Study	Country	PV Capacity	Battery Storage	Notes / Source
Demonstrational Pavilion – Sofia	Bulgaria	4.8 kWp	N/A	MDPI (water-flow glazing study)
PV-ESTIA Residential Pilots – Plovdiv	Bulgaria	13.5 kWp (total)	48 kWh (total)	PV-ESTIA reports
POWERTY Pilots – Social Buildings	Bulgaria	2×10 kWp; 1×5.8 kWp	2×34 kWh; 1×12 kWh	POWERTY project
Municipal Admin – Plovdiv (scenario)	Bulgaria	Modelled (up to 80% demand)	Modelled with retrofit	Techno-economic study
Alexandroupolis Positive Energy Community	Greece	≈500–550 kWp (community estimate)	Storage modelled in scenarios	MDPI / project papers
Calolziocorte Gymnasium (design case)	Italy	PV modelled (scenario-dependent)	Depends on design	MDPI / ResearchGate

LUCIA – Univ. Valladolid	Spain	PV + biomass + CHP (detailed in project reports)	Integrated system	Energy journal / case study
Belgian single-family nZEB study	Belgium	PV modelled (scenario)	No fixed value	MDPI case study
Ukraine nZEB guidance & Dnipro case	Ukraine	PV potential assessed (scenario-dependent)	Modelled	VTT report / national studies

Selected PV Capacities

Bar chart for selected cases where numeric PV capacity data is available. (Modelled or measured values only.)



References & Further Reading

- *MDPI — Alexandroupolis positive energy community studies (various papers).*
- *MDPI / ResearchGate — Case study of nearly zero energy building in Calolziocorte, Italy.*
- *Energy journal — LUCIA case study, Valladolid, Spain.*
- *VTT / National reports — NZEB guidance for Ukraine.*
- *PV-ESTIA and POWERTY project reports (Energy Agency of Plovdiv and project websites).*
- *MDPI — Water-flow glazing and PV demonstrator (Sofia).*