

Innovative training schemes for retrofitting to nZEB-levels

Fit-to-NZEB, a Horizon 2020 project continuing the legacy of the BUILD UP Skills Initiative within the Construction Skills topical area, aims to increase the competence and skills of the building professionals in 7 European countries - Bulgaria, Croatia, Czech Republic, Greece, Ireland, Italy and Romania - through unique educational programmes and pilot training courses, which will contribute to both the quality and the scale of the deep energy building renovations throughout EU.

Overview: project and major results

Exactly two years ago, we promised that we will do our best to set up a full range of innovative qualification and training schemes for deep energy building retrofitting supported by RES. This target included both elaboration of new training programmes and materials for all professional groups and support for development of innovative training facilities - with the goal to provide world-class practical training on building renovations aiming at Nearly Zero-Energy Buildings (NZEB) levels.

Today, we are proud to share the following results:

- A full review of deep renovation training programmes and materials;
- A set of learning outcomes on 17 topics related to deep energy retrofit, distributed according to the relevant EQF levels;
- 7 model training programmes, ranging from Master programmes' classes to short-term upskilling courses;
- Training materials on each of the 17 topics, including annotated presentations, exercises, examination questions and references;
- Fully equipped training facilities in 7 European countries;
- More than 150 newly trained trainers, capable to deliver the new training content using the practical training facilities;
- 20 pilot courses conducted in universities, professional high schools and vocational training centers, subject to continuous monitoring for improvement of the training schemes;
- More than 10 Memoranda of Understanding with education and training providers willing to use the new training programmes and materials;
- A large and constantly growing network of dedicated professionals, for whom deep energy retrofit has become a part of the daily routine and a source of professional pride and identity.





Learning outcomes: new knowledge, skills and competences for deep energy retrofits

Based on a thorough review of the existing training programmes and materials on deep energy retrofit and an analysis of the training gaps in the involved countries, a compendium of the knowledge, skills and competences required for deep energy retrofit was developed. The learning outcomes, organized in 17 distinct topics of relevance to NZEB-level retrofit process, are defined for each targeted level along the EQF. The required technical competences are collected and analyzed according to the identified needs of the pre-defined target groups – the main beneficiaries of the project, in close cooperation within a broad network of local stakeholders.

The review of the accessible training materials, the analysis of the training gaps and needs and the set of learning outcomes are freely available at our website – www.fit-to-nzeb.com. Being one of the most important outcomes of the project, they are delivered in a flexible format allowing application of any selected topic in respect to the specifics of the training plan of the interested educational institution or vocational training provider.



The process of developing the common learning outcomes demonstrated the value of the broad networks and national discussion platforms established under the BUILD UP Skills initiative of the EC. Without this large group of stakeholders which we were able to engage in all our discussions since 2011, it would have been much harder to cover all topic areas, and what is more important, to gain the trust of the VET institutions for piloting the courses. As a culmination of the whole process, these courses proved to be really successful – but it was only possible through this fantastic common effort supported by the strong international partnerships and local stakeholders' communities.

Dragomir Tzanev, EnEffect-Bulgaria, coordinator of the Fit-to-NZEB project

Development of demonstration and practical training models

A key component of the Fit-to-NZEB project is the organization of practical training facilities following the example of the Building Knowledge Hubs (BKHS), developed under the preceding Train-to-NZEB project (www.train-to-nzeb.com). The design of retrofit models for the purpose of training serve two functions: a) as demo models for the purpose of demonstration of typical construction detailing and sequence of elements as well as for sketching exercise, discussion and oral examination. These models comprise one complete solution in respect of achieving the unbroken continuity of airtightness, insulation, minimal thermal bridging and, preferably, wind-tightness. The construction types selected are typical for each country but retrofitted in respect of the higher building performance required to achieve nZEB levels; b) as practice models that more or less correspond to the demo model construction types but for the purpose of hands-on practical training and examination. Unlike the complete demo model, these models are stripped to their basic structure, providing the basis for the practical retrofitting work.

Detailed guidelines for establishing of dedicated practical training facilities are freely available at www.fit-to-nzeb.com, ready for use by any interested training provider. With the support of the project, 4 entirely new such facilities are set up - in Croatia, Greece, Ireland and Italy, and 3 existing ones expanded – in the Czech Republic, Romania and Bulgaria (with a new branch opening in the professional high school of architecture and construction in the city of Pazardzhik).



„It's is very important to see exactly how to install correctly a window or how to prevent mould and condensation in walls. It's also very useful to learn the commissioning of a residential ventilation system. For me as a building physicist this was all known in theory, but new in praxis. So it was very important to participate in a TTT course and get ready to share this knowledge with technicians and construction workers in our new facilities in the future.”

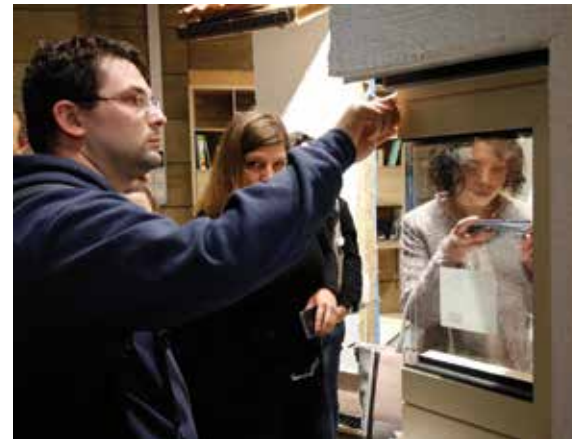
Dimitris Pallantzias, Certified PH Designer, Education Officer at HPHI



Train-the-Trainer courses

After providing the necessary training facilities and equipment and developing the training programmes, specialized train-the-trainer courses were organized for dedicated groups of trainers in each country. Following a common design and programme, including technical and, where necessary, pedagogic training, a specialized training programme was developed.

After an international train-the-trainer course conducted in Ireland by MosArt in the spring of 2018, the programme was applied in all partner countries. Undoubtedly, this was one of the most successful and rewarding stages of the project: more than 150 professionals took part in the national courses and enjoyed the engaging discussions with our trainers. Registering extremely high levels of satisfaction from both trainees and lecturers, the courses will continue to be offered by project partners on regular basis in order to sustain the steady market uptake of the new programmes at all levels and thus, to support the sustainability of project results.



Model training programmes

Based on the set of learning outcomes and the feedback from the international train-the-trainer activities, model training programmes on deep energy building renovation for higher education establishments (EQF level 6-7) specializing in architecture and civil engineering, professional high schools for architecture, construction and mechanical engineering, and specialized vocational training centers with a focus on hands-on training were developed. The programmes are outlined according to the expert evaluation of educational gaps and skills needed on the emerging NZEB market and integrate available and newly designed e-learning tools, facilities for practical demonstration and training, and examination programmes, available from the practice of the partner organizations and a set of selected EU projects.



Just as the set of learning outcomes, the model programmes are not a requirement for training and educational institutions but on the contrary – a reference and even an invitation for re-design by any interested VET provider, according to its own training plan and agenda. Thus, encouraging cooperation in the sector by providing a shared and open knowledge base, the project paves the way for future action, targeting mutual recognition of NZEB-related skills and competences among an increasing number of countries.

Bulgaria

Pilot courses: country highlights

The project in Bulgaria closely followed the footsteps of its predecessors BUILD UP Skills EnerPro Train-to-NZEB, using the broad network, experience and facilities developed during the years to enable application of deep energy retrofit training among all levels of the VET system. This time, with the University of Architecture, Civil Engineering and Geodesy attracted as project partner, a brand new discipline on “Management of Deep Energy Building Retrofit” was piloted for last-year students. The Professional High School for Architecture and Construction in Pazardzhik was attracted for integration of materials in the educational curricula, with the new discipline “Energy Efficiency and Ecological Construction” to be started in 2019. Pilot courses, including courses for validation of skills and knowledge acquired at the workplace, were conducted in the BKH in cooperation with the Bulgarian Association for Insulation in Construction and the (only) local producer of MVHR units Tangra. Full information about the local activities is available at www.eneffect.bg; a schedule of the training courses (in Bulgarian) is to be found at any time at www.busenerpro.com.



„As a certified passive house building designer, it has been extremely useful for me to see and apply on site the specific techniques for achieving airflow and the efficient operation of ventilation systems with heat recovery. I believe that this will be beneficial both for training in our new training centers and for our practical work in designing nearly zero-energy buildings.“

Alexander Stankov, EnEffect Design

Croatia



The Faculty of Civil Engineering at the University of Zagreb was the first Fit-to-NZEB partner to implement a discipline on Deep Energy Retrofit in the academic curricula, facilitated by a newly equipped practical training and demonstration center and a number of study visits at actual construction sites, allowing the students to put the newly acquired skills and knowledge into practice. By all measures, the course was a definite success; especially because it made clear the high interest and willingness to learn more about NZEB from a student's perspective. Also, what is important, the project brought to the public attention the importance of quality deep energy retrofit not only for the construction industry, but for the health and well-being of the occupants. This was helped by the established media partnerships and the series of highly successful academic and public events ensuring application of the Fit-to-NZEB outcomes not only in the educational activities but also in the actual construction practice.

More information about the project in Croatia can be found at www.grad.unizg.hr/en.



Dear Professor and Respected Assistants,

I wanted to tell you that I'm not sorry to have enrolled building physics, in contrary...

I am thrilled with the course and effort you invest in providing us with a quality education:

- high quality live lectures with current examples and videos*
 - bring specimens and samples of the systems to lectures*
 - organize live experiments and tests for us*
 - organize guest lectures and technical visits*
 - you listen to the students' thoughts and criticisms*
 - you encourage the writing and presentation skills of us students through seminars and pitch presentations*
 - developed models with the full scale (1:1) details which are installed in the yard building*
- Keep doing it!*

Krešimir Kolesarić, student Faculty of Civil Engineering, University of Zagreb



Czech Republic



As a part of the international project Fit-to-NZEB, innovative study materials for deep energy retrofitting were introduced at the Faculty of civil engineering of Czech Technical University in Prague (ČVUT). The introduction was first of all intended to support teachers of professional colleges, high schools and technical universities, as well as for trainers of vocational trainings. Four professional high schools (from Kadaň, Jihlava, Pilsen and Karlovy Vary), two technical universities (ČVUT in Prague and VŠTE in České Budějovice) and an independent professional trainer have participated in the meetings.

Implementation of the training materials into the study programmes of technical universities was carried out by the Department of Construction Management and Economics at the Faculty of Civil Engineering, ČVUT in Prague. The implementation of pilot trainings designed for lifelong learning of construction workers was provided by the company SEVEN, The Energy Efficiency Center in its training centre. Universities and secondary schools of Civil Engineering have shown their interest in training materials as well. The training materials can be obtained for free upon Memorandum signing for non-commercial education purposes.

Full information about the activities can be found at

www.svn.cz and www.cvut.cz.



„The unique models of building constructions in the Prague training center are great examples of nearly Zero Energy Buildings and deep energy retrofits. The students see the real details of modern construction solutions presented at attractive practical form.“

Jan Fibiger, ABF Foundation

Greece

Building a strong professional community to spread the knowledge about NZEB construction – that is the key word for the activities in Greece, which were adeptly carried out by local partner Hellenic Passive House Institute. Based on a continuous partnership with local and international suppliers of NZEB-suitable products and materials, a new Building Knowledge Hub was founded in two locations in Athens, displaying all that is needed to reach national and international sustainable building construction standards. A number of training activities were completed, from very intense train-the-trainer courses combined with the biggest events in the sector, to agreements with the professional associations of distributors of insulation materials and window installers for dedicated courses for their members. On top of the well-visited and appreciated training for construction workers, the market development is visible: with the help of Fit-to-NZEB support, the market demand for NZEB projects is steadily rising – and so is the need for vocational education and training in the field!

For more information, visit the website of the Hellenic Passive House Institute at www.eipak.org.



Ireland



That's a wrap! External wall insulation contractor demonstrates his true love for insulated window sills used in deep retrofit projects during one of the Fit-to-NZEB trainer the trainer sessions.



With long-standing practice in vocational training for NZEB design and construction and experience from actual passive house projects on 3 continents, the Irish partner MosArt has definitely established itself as knowledge leader - not only in the Fit-to-NZEB project, but in the European professional community. However, what was achieved in Ireland in the last 2 years is simply stunning: a dedication of public authorities to construct a large NZEB training center largely using the guidance available from Train-to-NZEB and Fit-to-NZEB projects was closely followed by a government decision to finance training courses for 50 000 building workers and specialists, again, putting into action materials and practices established in these two projects. This, combined with available incentives for energy efficient building retrofit for the end users and a well-developed system for recognition of the newly acquired competences, sets a firm base for fast adoption of the new building standards in the actual construction practice. What is more, the training practice followed the pattern and moved away from the classrooms – the first examples of on-site skills training using the Fit-to-NZEB programmes and materials already showed incredible results and undoubted added value!

For everything concerning the latest NZEB training experiences and practices from Ireland, consult www.mosart.ie and www.passivehouseacademy.com.



Getting down to detail: a Passive House ,compact unit' consisting of ventilation with heat recovery, domestic hot water and an exhaust air heat pump, provides great interest for the Fit-to-NZEB contractors as part of their on-site training.



The Passive House EnerPHit plaque in deep retrofit is awarded to Dublin Lord Mayor Nial Ring and Dublin City Architect Ali Grehan for their projects for senior citizens in Dublin. Fit-to-NZEB partner Tomás O'Leary of MosArt presents the plaque at an official opening ceremony.

Slowly but surely, NZEB gains pace in Italy, and the activities of the national partner ZEPHIR supported by the Fit-to-NZEB project are a convincing proof of this statement. A new practical training center was established with the support of the local technical college ITS – Varese, where the pilot phase of the training was completed. Previously mentioned but never done in practice, the training models were constructed during the course of the training by the trainees themselves through an intensive learning-by-doing process, which is in the core of the construction industry. Additionally, two short-term pilot courses for construction workers were conducted, adeptly blending the Fit-to-NZEB programmes in the well-established training practice of ZEPHIR.

The final Fit-to-NZEB conference also took part in Italy within the frame of MADE Expo, the largest construction fair in the country. More than 100 participants visited the BuildSmart (BSmart) event, queueing up to register and listening carefully to the last minute, convinced that new practices in design and construction demand a new set of skills and knowledge – and that is what Fit-to-NZEB delivers.

Full information about Fit-to-NZEB activities in Italy is available at www.passivhausitalia.com.

Italy



“Fit-to-NZEB was a great success for the Italian building sector building capacity in (DER).

Learning by doing was the key to the successful results: tradespeople could experience energy efficiency implementation, they are now ready to replicate it on the work site!

Professional high school trainings were held within Fit-to-NZEB project with excellent results among participants. Professionals for the future are now ready!”

Dr. Phys. Francesco Nesi



Romania



Following a long-standing tradition inspired by previous projects as BUILD UP Skills QualiShell and Train-to-NZEB, Romania witnessed the first Fit-to-NZEB course for professional high schools – and with what success! Engaging 50 students in 2 classes of the Technical College for Architecture and Public Works „I.N.Socolescu” in Bucharest, the course had just one setback: time was not sufficient to encompass all new valuable content delivered by the project!

It continues in the next academic year, already spread over two semesters, and Memoranda for Understanding for its implementation are agreed with two other high schools in the city.

Two Train-The-Trainers sessions for high schools and universities engaging 60 teachers from all over the country who are interested to introduce the course in their school curriculum, were also successfully organized in Bucharest.

Such trainings, however, needs facilities for hands-on work: here, the Building Knowledge Hub hosted by URBAN-INCERC has definitely proven its worth! Further equipped with new models and rooftop RES demo installations, it not only supported the high-school training and piloted the courses for construction workers, but served as the perfect spot for networking, attracting of new partners from Romania and abroad, and, yes, a visit from EASME. All of this was only possible through the efforts of local partner Cluster for Promoting Nearly Zero Energy Buildings (Pro-nZEB), demonstrating that stable demand for NZEB construction and training can only be achieved through collaboration of all engaged actors! Find out more on www.pro-nzeb.ro.

„The module PASSIVE HOUSE - BASIC PRINCIPLES FOR TRANSITION TO NZEB is introduced in the curriculum of the Construction and Architecture High School. The students have been receptive to the new school subjects and have acquired knowledge, skills and competence in the field of their qualification. As a result, we have decided to continue the course in the next academic years.”

Eng. Liana Stanciu - Technical College „I.N.Socolescu” Bucharest

Networking and awareness raising

Continuing the tradition of the National Platforms for Dialogue between the construction industry, energy sector and the VET providers stemming up from the BUILD UP Skills initiative, Fit-to-NZEB supported more than 30 national networking events:

- In Bulgaria, we started a national NZEB conference and exhibition, in cooperation with the Ministry of Energy and all relevant professional associations;
- In Croatia, a sequence of successful events culminated in a closing conference in the framework of the Zagreb Energy Days visited by more than 130 people, with lots of promises for the future;
- In the Czech Republic, the cooperation between SEVEN, the Czech Technical University in Prague and the Architecture and Building Foundation lead to Fit-to-NZEB courses officially recognized by the Chamber of Charter Engineers in their life-long learning programme;
- In Greece, the traditional national Passive House conference was brought to a new life, hosting events with more than 200 participants in Athens and Thessaloniki, coupled with Fit-to-NZEB training courses;
- In Ireland, Fit-to-NZEB motivated a broad partnership between national and regional authorities, training providers and the industry, resulting in a brand new training center and a large scale national upskilling campaign which plans to reach 50000 building professionals
- In Italy, two national Passive House conferences brought Fit-to-NZEB to the attention of more than 500 participants from all over the world, combining motivational speeches with engaging study visits showcasing the best of the design and construction practice
- In Romania, local stakeholders took active part in the development of the Fit-to-NZEB learning outcomes, paving the way for large scale acceptance of the programmes and application of the training scheme among all levels of the educational system.



Ensuring EU-wide impact

From the EU Sustainable Energy Days to the International Passive House Conference, Fit-to-NZEB demonstrated its potential to be integrated within the education and training systems and research activities all around the continent. Here are some of the highlights:

- Fit-to-NZEB insights and experience were shared at the 22nd International Passive House Conference on 9-10 March 2018 in Munich, ranging from topics from life-cycle cost analysis to direct training experiences from the Building Knowledge Hubs;
- Together with Train-to-NZEB, the project team won the awards for best designed workshop and best workshop facilitation at the C4E forum in Serock, Poland on 13-16 June 2018;
- The coordinator of both projects was invited to share experiences and present the success factors at the EASME Horizon 2020 Energy Efficiency Info Day on 22nd January 2019 in Brussels;
- In May and June 2019, we are at CLIMA 2019 in Bucharest and the EU Sustainable Energy Days in Brussels, where avenues for further development and use of the results will be explored;
- A cooperation initiative with H2020 projects iBROAD, ALDREN, HAPPEN and Triple A-Reno will provide further integration of topics as building certification and renovation roadmaps into the training agenda.



Fit-to-NZEB coordinator Dragomir Tzanev presenting Train-to-NZEB and Fit-to-NZEB as successful practices at the Horizon 2020 Energy Efficiency Info Day in Brussels, 22 January 2019

Next steps

With a network of Building Knowledge Hubs currently active in 9 European countries – Bulgaria, Croatia, Czech Republic, Greece, Ireland, Italy, Romania, Turkey and Ukraine – the project team is willing to position itself as one of the most recognized NZEB training establishments, offering world-class upskilling courses sourced customized to the local needs and in collaboration with the construction industry. To this end, a certain set of requirements is needed, including continuing cooperation with the leading research institutes, mutual recognition of training results and common certification, integration of innovative tools and methods (including on-site and web-facilitated training) in the training scheme. It however would not be enough: in order to stimulate the demand for NZEB training, we need a steady demand for NZEBs on the real estate market. This, in no doubt, is a complex task requiring common efforts by policy makers, industrial and market actors, and the civil society, but in all cases, the BKH network will be an active part of the process, as our mission remains intact: to constantly increase the competence and skills of the building professional to deliver high quality nearly zero-energy buildings.



Vincent Berruto, Head of Energy Unit at the Executive Agency for Small and Medium-sized Enterprises (EASME), on a visit to the Romanian Building Knowledge Hub situated at the headquarters of URBAN-INCERC in Bucharest. The place has become a favourite meeting spot for the Romanian professionals, manufacturers and VET providers, sending a strong signal to policy makers on the importance of skills development for the actual implementation of the NZEB standard in the construction practice.



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