



# research<sup>eu</sup>

RESULTS PACK ON CONSTRUCTION SKILLS

A photograph of three construction workers. In the foreground, a man wearing a white hard hat, safety glasses, and a dark jacket is pointing towards the right. Behind him, a woman wearing a blue hard hat is looking in the same direction. In the background, another person wearing a blue hard hat is partially visible. They are all looking at a tablet device held by the woman in the foreground.

New skills for the construction sector to achieve European energy targets

Through its BUILD UP Skills initiative, the EU aims to equip the next generation of construction sector workers – from manual labourers to design professionals and senior management – with the skills and knowledge needed to ensure building and renovation projects meet stringent energy efficiency requirements. This new CORDIS Results Pack presents some of the showcase EU-funded projects that have designed and implemented impressive upskilling programmes to turn this ambition into a viable reality across Europe.

*The building sector offers a large untapped potential for cost effective energy savings. Nearly Zero-Energy Building (NZEB) standards become a mandatory requirement in Europe as from 2020. The most challenging aspect of reducing energy use in the building sector lies in increasing the rate, quality and effectiveness of building renovation since the current rate of renovation is only 1.2% per year.*

*One important barrier that hampers the development of NZEBs and effective renovations is the lack of adequate construction skills. Improving the skills of middle- and senior-level building professionals, as well as the various trade professionals in the area of sustainable energy efficient construction is therefore of key importance.*

*Against this background, the EU launched in 2011 the BUILD UP Skills initiative (<http://www.buildup.eu/en/skills>). It aimed to increase the number of qualified trade professionals by developing national qualification platforms and roadmaps, and providing training in the field of energy efficiency and renewable energy in buildings. The scope of the initiative has been expanded to other building professionals under Horizon 2020, with projects developing multi-country qualification and training schemes.*

*Upskilling towards energy efficiency and sustainable energy should be done throughout the entire value chain of the buildings sector (including designers, architects, engineers, building managers, technicians, installers and workers including apprentices).*

*All of these professions also need to be aware of new and upcoming challenges relating to Nearly Zero-Energy Buildings. These include new materials and products, the integration of renewable energy sources, new systems or processes, such as standardisation and common voluntary certification of buildings, and the use of Building Information Modelling (BIM) tools.*

*Upgrading or setting up large-scale qualification and training schemes in these areas goes hand-in-hand with initiatives that increase the demand for skilled building professional, creating new job opportunities and boosting Europe's economic competitiveness.*

*This Results Pack focuses on five EU-funded projects based across Europe that have driven forward the BUILD UP Skills initiative.*

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# Training construction workers on energy efficient building practices

The EU-funded BUStoB project is working to help the construction industry acquire the skills needed to make Europe's building stock greener.

The EU-funded BUStoB (BUILD UP Skills to Business) project is working to fill this skills gap in the Netherlands. The project's main goal is to develop a large number of training modules covering a range of subjects related to green skills for the building and installation workforce. "The project went beyond just designing training courses," says project coordinator Peter Smulders. "To ensure a sustainable building environment, researchers also sought new ways to stimulate demand so that more workers would participate in the green skills training."

In addition to designing and promoting the training modules, the project also developed quick skill assessments. "These assessments help raise awareness among the workforce about the importance of energy efficient building design, identify skill gaps and promote the need for training," explains Smulders. "They're meant to serve as an easy way to highlight the need to participate in the full training."

## There's an app for that

In total, the project developed 76 short e-learning courses on such topics as nZEB technologies, quality assurance and interdisciplinary skills, among others. Many of these courses are available via online media, including the Build Up Skills advisor app. "We incorporated the app's Learning from Building Errors assessment tool into several of our training modules," says Smulders. "Our trainers can use this assessment's short set of questions to enhance the impact of their training."

In addition to this assessment tool, the app also offers seamless and free access to all BUStoB's e-learning modules, along with job-specific overviews of other learning opportunities. "Our online instruments for disseminating and promoting the training have proved to be of great value

for projects of this sort," adds Smulders. He notes that the app was funded in large part by OTIB, a project partner. OTIB has since donated the app to the consortium, thereby making it available to other EU projects.

## From demand to action

Thanks to its focus on practical information and regional partnerships, the project successfully triggered an increase in demand for green skills training. "We are very proud of the alliances we forged during the project, such as those between the building and installation sector, vocational training institutes and local and national governments," says Smulders. "As a result, the training resources



*"As the project comes to a close, we now face the challenge of getting employers and employees to use the training. After all, it's one thing to raise awareness, but another to translate this awareness into concrete action"*

developed during the BUStoB project are playing a central role in the human capital agenda of our country's National Energy Agreement."

Project researchers are now finalising the training modules and further elaborating their availability on the Build Up Skills advisor app. Once completed, they will turn their attention to putting their work into action by getting the construction industry to buy into the need to develop their green building skills via the BUStoB training courses. "As the project comes to a close, we now face the challenge of getting employers and employees to use the training," says Smulders. "After all, it's one thing to raise awareness, but another to translate this awareness into concrete action."

<b>Project</b>	<b>BUStoB - BUILD UP Skills to Business</b>
Coordinated by	OTIB in the Netherlands
Funded under	H2020-ENERGY
Project website	<a href="https://buildupskills.otib.nl/">https://buildupskills.otib.nl/</a>
Build Up Skills advisor app	<a href="https://play.google.com/store/apps/details?id=nl.geckotech.buildupskills&amp;hl=en">https://play.google.com/store/apps/details?id=nl.geckotech.buildupskills&amp;hl=en</a>



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## Green training for construction managers

Partners with the EU-funded ingREeS project have developed training programmes on energy efficiency and using renewable energy in buildings specifically for middle and senior level construction professionals.

The project was dedicated to achieving two objectives. First, it analysed the construction industry's knowledge about energy efficiency and using renewable energy sources in buildings. Second, it reviewed what skills were lacking and what needed to be done to deliver these skills to construction professionals.

Although the project was limited to the construction craftsmen and on-site workers, Slovak and Czech partners decided to expand on its findings to address the skill and knowledge needs of middle and senior level construction professionals. The outcome was the EU-funded ingREeS (Setting up Qualification and Continuing Education and Training Scheme for Middle and Senior Level Professionals on Energy Efficiency and Use of Renewable Energy Sources in Buildings) project.

"If our objectives were to be achieved, we realised that it wouldn't be enough to limit our focus to those who build the buildings,"

says ingREeS Project Coordinator Frantisek Doktor. "The objective of this project was to ensure that the designers, decisions makers and site managers who lead the construction efforts are equipped with the skills and knowledge needed to make energy efficiency and renewable energy use a part of their day-to-day procedures."

### Accredited training programmes

The project developed national qualification standards and training programmes on the use of renewable energy sources in buildings specifically geared towards Czech and Slovak middle and senior level construction professionals. The trainings are delivered via a combination of in-class lessons, distance learning and practical demonstrations. At the end of the programme, participants are assessed using online testing and, based on the results, receive an official certification.

Getting the managers to the training, however, was no simple task. For example, in Slovakia, partners had to overcome the country's missing culture of continuing education and training among civil engineers. In the Czech Republic, although the culture of continuing education was already developed, training on energy efficiency was notably lacking. "To succeed, we had to pay extra attention to the innovativeness of the programmes, ensure easy access to the trainings and focus on the quality and value of the content being delivered," says Doktor. "As the information had to be up-to-date, we built the system so it can be easily updated and adapted to the latest news and developments."

### A new class of accredited professionals

The efforts paid off, as over 900 middle and senior level professionals have received certification – well over the anticipated 700. Furthermore, feedback from these participants shows that over 60% of the information they learned was completely new, while the rest of the information provided a deeper understanding



*"The objective of this project was to ensure that the designers, decisions makers and site managers who lead the construction efforts are equipped with the skills and knowledge needed to make energy efficiency and renewable energy use a part of their day-to-day procedures"*



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of concepts they were already familiar with. “Participants will now use this information in their daily work as architects, site managers, supervisors and sustainability counsellors,” adds Doktor. “This will not only lead to a marked improvement in the quality of their work, but also ensure that the buildings they are responsible for achieve their energy performance targets.”

Even with the project now officially closed, the training goes on. “The project’s partners not only continue to deliver the training, but also continue to improve its contents and expand its impact,” adds Doktor. “For example, we are adding training on how construction professionals can implement Building Information Modelling into a building’s entire life-cycle.”

<b>Project</b>	<b>ingREES - Setting up Qualification and Continuing Education and Training Scheme for Middle and Senior Level Professionals on Energy Efficiency and Use of Renewable Energy Sources in Buildings</b>
Coordinated by	Slovak Chamber of Civil Engineers in Slovakia
Funded under	H2020-ENERGY
Project website	<a href="http://www.ingrees.eu/en/about-project/">http://www.ingrees.eu/en/about-project/</a>

## Developing energy-efficient competencies in tomorrow’s building managers

The EU-funded MENs project developed specialised training to teach architects and engineers how to retrofit housing stock to meet Near-Zero Energy Building standards.

The EU-funded MENs (Meeting of Energy Professional Skills) project focuses on developing the professional skills that building managers need to create and operate more energy efficient buildings. “I really care a lot about this project because it is so important to develop professional skills, and particularly those of women pursuing a career in architecture and engineering,” says project coordinator Daniela Melandri. “We accomplished this by providing a series of accredited training activities that have been developed by nine universities and three leading market players in the field of Near-Zero Energy Buildings, or NZEB.”

The integrated, interdisciplinary MENs training programme involved a combination of nationally accredited professional courses, e-learning and webinars and real case studies. The bulk of the training focused on teaching these professionals how to retrofit housing stock for NZEB standard. Through the training, the project aimed to increase the use of renewables by at least 29 GWh/year.

Project researchers also worked closely with the PROF/TRAC project, another EU-funded project focusing on providing training



to future NZEB trainers. Considering the complementary nature of their activities, the two projects organised several joint workshops.

### Big numbers

In total, the MEnS project provided over 5 500 hours of training, successfully increasing the knowledge and skills of over 1 206 building managers located in ten European countries. Of particular note is the project’s focus on developing the skills of women and unemployed engineers and architects. Over 50% of the training participants were female, and 33% were unemployed. “This was an amazing result, well over what we had initially expected,” says Melandri.

To disseminate the project’s outcomes, MEnS benefited from a partnership with RTBF, the Belgian public television broadcaster. RTBF produced a range of audio-visual material, including training videos, webinars, live broadcasts of the conferences and documentaries of the case studies – many of which were also shared via Facebook. These actions significantly expanded the project’s reach. On facebook alone the videos were watched by 28 000 viewers and more than 1 500 people followed the webinars.

### Work continues

Even after the project’s close, its impact continues. For example, the various universities that participated in the project have each committed to continue to provide training for NZEB students and

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professionals. Furthermore, MEnS researchers have established an official association, USE Efficiency, in order to structure possible future collaborations between the project partners.

Project	MEnS - Meeting of Energy Professional Skills
Coordinated by	ENERGIA-DA SRL in Italy
Funded under	H2020-ENERGY
Project website	Homepage <a href="http://www.mens-nzeb.eu/en/">http://www.mens-nzeb.eu/en/</a> Accredited training activities <a href="http://www.mens-nzeb.eu/en/education/distant-learning/courses/">http://www.mens-nzeb.eu/en/education/distant-learning/courses/</a>
Video	<a href="https://www.youtube.com/watch?v=DYzZk_JQv9E">https://www.youtube.com/watch?v=DYzZk_JQv9E</a>



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## New platform delivers zero energy training resources

Building professionals can improve their energy efficiency skills using a new EU-funded online platform. Training materials are freely available to help architects, engineers and other professionals better design and build low energy constructions.

The PROF/TRAC (PROFessional multi-disciplinary TRAINing and Continuing development in skills for NZEB principles) project has developed an open training platform that is both free to use and continuously updated. It includes a voluntary EU-level training and qualification scheme that can be adapted at the national level to suit specific needs, as well as information about the professional profiles needed to achieve Nearly Zero-Energy Buildings (NZEB). The platform also offers free self-assessment tools for professionals to evaluate their skills and identify knowledge gaps, as well as train-the-trainer programmes and webinars.

"This is a training material repository," explains PROF/TRAC project coordinator Dr Peter Op 't Veld from Huygen Installatie Adviseurs in the Netherlands. "Construction professionals can first use our methodology to map their skills and identify training gaps, and then select the materials that best suit them." Completed in February 2018, the Platform is already being used by other EU-funded H2020 projects like BIMplement and TripleA-reno as a valuable training resource.

### Upskilling professionals

The PROF/TRAC project was launched in 2015 to address the need for upskilling building professionals, such as architects and engineers, in zero energy construction and renovation. "PROF/TRAC came out of a previous project in which we developed educational material specifically targeted at encouraging interdisciplinary NZEB design," explains Op 't Veld. "What were missing though were tools to encourage collaboration between so-called white-collar professionals, like architects and engineers."

The project therefore sought to develop courses that bring together NZEB architectural principles with, for example, mechanical engineering challenges. To do this, the project team worked with three key European umbrella organisations: the Architectural Council of Europe (ACE); REHVA (representing engineers in building services); and Housing Europe, the European federation of public, cooperative & social housing. "For Housing Europe there was an

acknowledgment that building managers should be trained and upskilled for the operational phase of zero-energy buildings, as well as in maintenance and procurement," says Op 't Veld.



*"These trainers will act as ambassadors of the PROF/TRAC project and can create a kind of snowball effect by initiating new training"*

### Addressing skills gaps

The project began by developing an effective methodology to map the professional skills needed for NZEB. This helped to identify gaps in skills and knowledge, which could then be bridged through the development of training programmes.

The project went on to develop European qualification schemes for professionals involved in NZEB. "This has been worked on throughout the project and was the final task to be completed," says Op 't Veld.

The project also carried out training sessions for teachers. "We took the approach of training the trainers rather than conducting large-scale sessions," explains Op 't Veld. "The idea is that these trained experts can then design national courses and conduct training sessions on the national scale. These trainers will act as ambassadors of the PROF/TRAC project and can create a kind of snowball effect by initiating new training."



“The training materials and resources available on the PROF/TRAC platform will contribute towards reducing the skills mismatch for professionals and increase managerial capacity to support innovation and sustainable energy use in buildings,” concludes Op ‘t Veld.

Five training sessions were held in total with members of national chapters of the architectural and engineering umbrella organisations involved in PROF-TRAC. The first three face-to-face sessions successfully trained around 70 trainers from REHVA and ACE, who have since gone on to conduct a first round of national programmes, training around 900 people in six national pilots. A list of certified PROF/TRAC trainers and training organisations across Europe is available on the platform. A further two training sessions took the form of online webinars.

<b>Project</b>	<b>PROF/TRAC - PROFessional multi-disciplinary TRAINing and Continuing development in skills for NZEB principles</b>
Coordinated by	Huygen in the Netherlands
Funded under	H2020-ENERGY
Project website	Homepage <a href="http://proftrac.eu/">http://proftrac.eu/</a> Open training platform <a href="http://proftrac.eu/open-training-platform-for-nzeb-professionals.html">http://proftrac.eu/open-training-platform-for-nzeb-professionals.html</a> Training and qualification scheme <a href="http://proftrac.eu/training-material/search-training-material.html">http://proftrac.eu/training-material/search-training-material.html</a> Self-assessment tools <a href="http://proftrac.eu/nzeb-skills-and-qualification-scheme/improve-your-skills.html">http://proftrac.eu/nzeb-skills-and-qualification-scheme/improve-your-skills.html</a> Train-the-trainer programmes <a href="http://proftrac.eu/events/proftrac-train-the-trainers-program/general-information.html">http://proftrac.eu/events/proftrac-train-the-trainers-program/general-information.html</a>

## Promoting hands-on energy efficiency training

The EU-funded Train-to-NZEB project has established world-class energy efficiency training facilities and innovative new teaching programmes at five central and east European countries. This will enable the next generation of construction professionals to develop the skills and expertise needed to meet growing demand for net zero energy buildings (NZEB).

The training centres - or Building Knowledge Hubs - form part of a growing international network that combines theoretical lessons with practical hands-on exercises. The network also aims to increase interest in and awareness of NZEBs and stimulate market demand for optimal energy efficiency in new buildings and renovations.

“New NZEB standards are being developed at the national level,” explains project coordinator Dr Dragomir Tzanev, from the Center for Energy Efficiency EnEffect, Bulgaria. “Meeting these new standards requires changes in how both designers and construction workers are trained. We also need to change the way we think about buildings, and this has to trickle down to end users. Consumers are the real change agents in this process, as if

there is no demand from the market, there will be no demand for training.”

As the three-year project nears completion, training facilities in Bulgaria, the Czech Republic, Romania, Turkey and Ukraine are already putting Train-to-NZEB's courses into practice. The aim at the outset was to train 90 trainers in total, a target that has already been achieved.

“We are also getting close to our aim of training 2 400 construction workers, 480 designers and 720 non-specialists that include public authorities, NGOs, the media and facility managers,” says Tzanev. “I’m also very proud of what we have achieved in Turkey and Ukraine; the training centres there are carrying out really impressive work.”



## Hands-on experience

Train-to-NZEB began in 2015 with a preliminary analysis of the training gaps that exist, and how these could best be addressed. Leading research and training institutions from Germany (Passive House Institute) and Ireland (Passive House Academy and Limerick Institute of Technology) were identified as ideal partners for transferring knowledge and experience. “Ireland has a lot of experience in combining standard classroom training with practical courses,” says Tzanev. “Hands-on experience is a really important part of the learning process.”

Both Germany and Ireland also have well-established certification schemes for both designers and tradespeople. “Offering a variety of training courses will enable training facilities to really offer something different to the market and meet the diverse training demand,” adds Tzanev. Training courses tailored to builders, designers or end users focus on basic concepts such as energy saving, NZEB and the implementation of new building standards and offer practical experience with innovative materials and tools.

*“Consumers are the real change agents in this process, as if there is no demand from the market, there will be no demand for training”*

a culture of exchange. This is the only way we can improve and ultimately meet the demands of customers.”

As their profile rises, Tzanev hopes that network training facilities will begin to take on more consultancy work on actual construction projects. He also predicts that blended learning – a combination of online distance learning with hands-on experience at training centres and classroom learning – will be an important fixture in the future. “Training for professionals working in remote areas is only possible through good distance learning,” he says. “By engaging with as many stakeholders as possible and broadening our training offer, we can ensure that our model is sustainable.”

## Expanding network

Tzanev hopes that the Train-to-NZEB network concept will now be further developed and expanded. The new EU-funded project, Fit-to-nZEB, extending the network to Greece, Italy and Croatia was recently launched, with a focus on energy efficient building renovation.

“The goal here is to offer training programmes at all levels, from high school leavers to professionals,” he says. “This project carries on the Train-to-NZEB idea of sharing and developing programmes together, and it really shows that we are building

<b>Project</b>	<b>Train-to-NZEB - The Building Knowledge Hubs</b>
Coordinated by	Center for Energy Efficiency EnEffect in Bulgaria
Funded under	H2020-ENERGY
Project websites	Train-to-NZEB <a href="http://www.train-to-nzeb.com/">http://www.train-to-nzeb.com/</a> Training facilities <a href="http://www.train-to-nzeb.com/partners.html">http://www.train-to-nzeb.com/partners.html</a> Train-to-NZEB courses <a href="http://www.train-to-nzeb.com/courses.html">http://www.train-to-nzeb.com/courses.html</a> Fit-to-nZEB <a href="http://www.fit-to-nzeb.com/">http://www.fit-to-nzeb.com/</a>



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