



Dedicated to stimulate the demand for sustainable  
energy skills in the construction sector

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<b>Report:</b>	<b>Proven approaches for the recognition of energy efficiency skills (D2.1)</b>
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## SUMMARY

New requirements – related to the high energy performance of buildings or "nearly zero energy building standards" – are the main challenges for the construction industry across Europe. In order to be able to implement this sensibly, workers must be trained accordingly. Much content and knowledge has been created through already implemented upskilling projects. In a first step, the situation relating to further education in partner countries is summarised. In the next step, results and experiences regarding the recognition of energy efficiency skills and the associated effects on stimulating market demand are collected and analysed.

In this context, the report discusses the following problems and challenges of the partner countries. In Austria, France and Ireland, initial training is structured as an apprenticeship training system. The recognition of initial training is fully developed at the national level in all partner countries. Unfortunately, there is hardly any focus on initial training in energy efficiency and renewable energies in most partner countries at present. Moreover, the offer of further education in the building sector is very limited in many partner countries. In all partner countries, however, further education modules on energy efficiency skills can be attended on a voluntary basis. Therefore, recognition is voluntary and not required by the government or the customers. In addition, there is hardly any national or international recognition of further education in energy efficiency skills in Austria, France, Spain and Bulgaria. In the Netherlands and Ireland, there is a well-developed system of recognition of further education at national level, but international recognition of these training courses is not satisfactory.

In general, the following applies in the construction sector at present: low price over high quality. For this reason, most construction companies are not interested in their employees attending training courses as this would result in higher salaries. Also, craftspeople cannot work on site when attending a course. Therefore, craftspeople are often not allowed to take part in time-consuming further education trainings. Moreover, in the building sector, knowledge is often passed on within the company through experience. This acquired knowledge can lead to an improvement in quality, but is not officially recognised. In addition, low transparency of actual training courses plays a role in some countries. Before attending a training, craftspeople cannot clearly see what the contents and benefits of the courses are and have no information about the recognition of these trainings. In Bulgaria, Spain, Ireland and France, only a small number of further education courses is available in the field of energy efficiency. In Spain, skills according to renewable energy systems are not recognised in the market. One reason for this is, that there is no certification system for renewable energy trainings. In Bulgaria, training certificates are often issued by training providers without any quality assurance. As a result, there is very little trust in training providers and their training offers, which leads to nearly no market demand. Last but not least, it has to be mentioned that end consumers are not able to differentiate between skilled and unskilled craftspeople in the field of energy efficiency at present.

To overcome these problems and challenges, this report also summarises possible solutions that have already been identified or developed in the partner countries from previous projects (e.g. BUILD UP Skills CrossCraft, CraftEdu, NEWCOM, Train-to-nZEB, Fit-to-nZEB, BIMplement, BUILD UP Skills QualiBuild, Skill-Passport, PROF/TRAC and BUStoB). The identified approaches serve as a basis for further work in the BUSLeague project. A possible solution to motivate blue-collar workers to participate in further education courses is to offer them a tailored in-house training and reduce the course duration to a maximum of one day. Furthermore, comprehensive quality management for the construction of nZEB, clear descriptions of further education training content and raising awareness for the importance of further education in the field of energy efficiency are required. To ensure high quality trainings, evaluation of available trainings, collaboration between training providers and the dissemination of cross-sector knowledge are essential. Establishing training and consultation centres for building professionals and end users is the basis for stimulating the market demand for nZEBs. Moreover, the development of qualification registers and Skill-Passport systems endorsed by relevant branch organisations and national authorities are necessary.

The following table gives an overview on country specific strengths and weaknesses in context with the mentioned problems, challenges and opportunities:

Table 1: Strengths and Weaknesses

	Strengths	Weaknesses
<b>Austria</b>	<ul style="list-style-type: none"> <li>• Dual education system</li> <li>• Personal certification trainings on highly efficient and renewable energy systems are offered</li> <li>• Successful implementation (high market demand) of on-site cross-craft trainings (BUILD UP Skills CrossCraft)</li> <li>• Specific mutual comparable training modules are already available (NEWCOM)</li> <li>• The national quality label “klimaaktiv building standard” is established and becomes more and more important.</li> </ul>	<ul style="list-style-type: none"> <li>• Hardly no recognition of upskilling courses in the field of energy efficiency and renewables</li> <li>• No trans-national recognition of upskilling courses in the field of energy efficiency and renewables</li> <li>• Further education is not required by the market</li> <li>• Hardly no awareness on the importance of cross-craft understanding</li> <li>• Further education trainings content is not shown transparently by most education providers</li> <li>• Construction companies show little willingness to provide further education to their employees</li> </ul>
<b>Bulgaria</b>	<ul style="list-style-type: none"> <li>• International certification and certification by product suppliers possible and valued</li> <li>• Trainings are flexible and have a short duration, to meet the needs of craftspeople (blended learning approaches)</li> <li>• Certification on international standards (e.g. Passive House, LEED, BREAAAM) gain increasing popularity</li> <li>• Build Up Skills EnerPro, Train-to-nZEB, Fit-to-nZEB and CraftEdu stimulated the supply of nZEB-related qualification and certification services</li> </ul>	<ul style="list-style-type: none"> <li>• Hardly no recognition of upskilling courses in the field of energy efficiency and renewables</li> <li>• Further education is not required by the market</li> <li>• Further education courses to improve energy skills are very limited</li> <li>• Lack of market demand for energy-efficient buildings in general</li> <li>• Hardly no awareness on the importance of cross-craft understanding</li> <li>• Qualification registers and Skill-Passport are met with strong resistance from the mainstream construction sector</li> <li>• Low quality of practical parts of further education courses</li> <li>• Construction companies show little willingness to provide further education to their employees</li> </ul>

<b>France</b>	<ul style="list-style-type: none"> <li>• The RGE certificate is required by the market, as it enables its clients to benefit from financial support from the state</li> <li>• The RGE certificate requires compulsory further trainings</li> <li>• The FIT trainings have been widely approved and recommended by operators and landlords</li> </ul>	<ul style="list-style-type: none"> <li>• Hardly no recognition of upskilling courses</li> <li>• No trans-national recognition of upskilling courses in the field of energy efficiency and renewables</li> <li>• Further education is not required by the market</li> <li>• Further education courses to improve energy skills are very limited</li> <li>• Construction companies show little willingness to provide further education to their employees</li> </ul>
<b>Ireland</b>	<ul style="list-style-type: none"> <li>• National Framework of Qualifications provides a structure to compare qualifications based on nationally agreed standards</li> <li>• Irish Qualifications Framework for lifelong learning helps to compare recognised qualifications in Ireland with the rest of Europe</li> <li>• Since the Horizon 2020 Build Upon project, key stakeholders are aware of the importance of skills recognition to drive demand for upskilling</li> </ul>	<ul style="list-style-type: none"> <li>• Hardly no awareness on the importance of cross-craft understanding</li> <li>• Users (homeowners and procurers) cannot identify construction workers who are upskilled in energy efficiency topics</li> <li>• No licensing system for building contractors (Contractors may set up as sole traders or register as companies without any vetting of competence or qualification)</li> <li>• Employers often do not realise the real demand for energy skills</li> </ul>
<b>Netherlands</b>	<ul style="list-style-type: none"> <li>• Well-developed national recognition system on further education (especially in the installation sector)</li> <li>• After the recognition of heat pump trainings, nearly all regions wanted an according training centre</li> <li>• Several regular education providers have incorporated materials from BUStoB and BUS_N@W into their VET education</li> <li>• Daily growth in the number of BUILD UP Skills Advisor app users</li> </ul>	<ul style="list-style-type: none"> <li>• Hardly no awareness on the importance of cross-craft understanding</li> <li>• Further education is not required by the market</li> <li>• Only very few upskilling courses on energy efficiency are obligatory by law</li> <li>• Skills formally acquired on the job do not count and are not properly valued</li> </ul>
<b>Spain</b>	<ul style="list-style-type: none"> <li>• The Spanish Ministry of Education has a very detailed qualification framework (QF) for blue-collar workers organised by modules</li> <li>• The Ministry of Spain already has a methodology to recognize the skills of blue-collar workers acquired through experience</li> </ul>	<ul style="list-style-type: none"> <li>• In Spain, there are no training requirements to work as a blue-collar worker in the construction sector</li> <li>• Both vocational training and university training include some aspects related to energy efficiency, but not certified training related to energy efficiency of buildings that addresses this issue as a whole</li> </ul>

	<ul style="list-style-type: none"> <li>• Public administrations increasingly demand a higher level of training for the staff of the companies that present themselves in public tenders</li> </ul>	<ul style="list-style-type: none"> <li>• The training offer of the Ministry of Spain is excessively long and hardly compatible for active workers. For this reason, most companies opt for private courses better adapted to their needs and availability</li> <li>• There is no "official" skills recognition system that gives confidence and transparency to the sector</li> </ul>
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The aim of the BUSLeague project is to counteract the identified problems and challenges through the following activities: extension of micro learning and e-learning offers; dissemination of a suitable methodology to describe knowledge imparted through courses to compile and recognise additional qualifications; expansion of the energy renovation register of construction workers who have upskilled in renovation so that homeowners can identify trained professionals (piloted in Ireland in early 2021); extension of successful training programmes in the field of energy efficiency in cooperation with training centres and hardware stores (especially Bauhaus); expansion and inclusion of the Skill-Passport.

## Introduction

New requirements – related to the high energy performance of buildings (nearly zero energy building standards) – are main challenges for the construction industry across Europe. In order to be able to implement this sensibly, workers must be trained accordingly. Much content and knowledge has been created through already implemented upskilling projects (national and European BUILD UP Skills and construction skills projects). Challenges in relation to the upskilling of building professionals have already been identified. Two of the main challenges are the lack of awareness of the benefits and principles of highly energy-efficient buildings and the lack of understanding among the building workforce of the need for qualifications in that area.

In this report, initial training and further education systems in partner countries are summarised. In addition, results and experiences regarding recognition of skills (including proving practical skills) and the associated effects on stimulating market demand are collected and analysed. In this context, the report discusses problems and challenges of the initial and further education and possible solutions. In previous projects, trainings for further educations were developed to improve the national education systems in participating countries. These approaches are described and the advantages and disadvantages explained.

The main goal of this report is to identify possible solutions from previous projects that can support the further implementation of the BUSLeague project. These can be divided into the following two areas of focus:

1. Results and proven experiences regarding recognition of skills (including proving practical skills) as well as lessons learned
2. Results and proven experiences regarding the effect of recognition on stimulating market demand in the countries involved

# I. Comparison of mechanisms for recognition of skills

The following chapter describes differences and similarities in national initial and further education in the participating countries. In this context, a focus is set on education that cover the topics of energy efficiency and renewable energies. In addition to considering the education system, an emphasis is also placed on the recognition of initial and further education.

## I.1. Initial education

In Austria and France, the apprenticeship system is structured similarly. Pupils have to attend a practical training in a company and at a vocational school (dual education). In Austria, apprentices spend 80% of their training time in the company and 20% at school. The studies take between 2.5 and 4 years to complete with a total of 1260 hours at school. There are three different ways for attending a vocational school in Austria: once a week on a given day throughout the year, training course of at least eight weeks or compressed in a block at specific times of the year. The Federal Ministry for Digital and Economic Affairs is responsible for apprenticeship training in Austria. The recognition of the standard apprenticeships is good in Austria.<sup>1</sup>

In France, vocational training is a matter of shared competences between the State, the regions and representatives of the business world. This system is called the “four-party system”. The State is responsible for the development of standards and strategies for vocational training. It guides the policy of continuing vocational training and apprenticeship aiming at securing professional careers and access to employment. Three ministries are particularly concerned in this context: the Ministry of Labour, the Ministry of National Education and the Ministry of Higher Education, Research and Innovation. Social partners manage the different bodies that collect compulsory company contributions to apprenticeship and vocational training, as well as the unemployment insurance system for jobseekers. They also contribute to the development of diplomas and take part in boards of examiners. France Compétences is the sole governance body for vocational training and apprenticeship. It distributes mutual funds to the various actors, regulates quality of training and controls the implementation of reforms. Moreover, France Compétences develops vocational titles and diplomas in close collaboration with branches.<sup>2</sup>

In Bulgaria, vocational professional high schools for architecture and construction, as well as vocational training centres offer courses for the qualification of blue-collar workers. However, they do not usually focus on energy efficiency. In addition, upskilling courses for professional qualifications are provided by both high schools and validation service companies who have licensed vocational training centres. However, this offer is limited. The same applies to training and certification for validation of skills and knowledge acquired at the workplace. Certification of persons who have successfully completed their training in professions and crafts from the List of Professions for VET is performed in compliance with the Law on VET. For acquiring the Professional Qualification Certificate, these graduates (trained at a school or vocational training centre) must pass state exams in theory and practice in the respective profession. The content of the qualification programmes in terms of units of learning outcomes (required knowledge, skills and autonomy) regarding the respective qualification level according to the national qualification framework (harmonised with the EQF [European Qualifications Framework]) is defined by the State Educational Standards, which also set the requirements for training providers in terms of qualification of trainers and availability of practical training facilities. The distribution of theoretic and practical training sessions as well as the allocation of hours to the different disciplines required to meet the learning outcomes are determined in educational plans approved by the Ministry of Education and Science for each professional occupation at every relevant qualification level.

In Ireland, craft workers also have to complete an apprenticeship. The apprenticeship system is organised by SOLAS (state agency for Further Education and Skills Service) in cooperation with the Department of Further and Higher Education, Research, Innovation and Science, employers and unions. An apprenticeship council is also in place. SOLAS manages a range of further education and training programmes including apprenticeships,

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<sup>1</sup> Buildup Skills Austria on 12.10.2020

<sup>2</sup> Cedefop, researched on 12.10.2020



traineeships, the “Skills to Advance” initiative and e-colleges (dual education). A craft apprenticeship generally usually last for 2 to 4 years. During this time students spend three different periods in off-the-job training. Generally, the first off-the-job training phase takes place in a centre of an education and training board (ETB), while the subsequent off-the-job training phases take place in an institute of technology. The skills students develop are assessed through on-the-job competence testing as well as off-the-job modular assessment and examinations. On successful completion of an apprenticeship, candidates are awarded a FETAC (Further Education and Training Awards Council) Advanced Certificate in a named trade at level 6 of the national framework of qualifications (= level 5 in the European Qualifications Framework).<sup>3</sup>

In the case of Spain, the public system offers two types of official recognition for blue collars: via the education system (vocational training) for initial education and the national employment system for the retraining of unemployed (professional certificates). The vocational trainings are modular and not a dual education. The reference for the organisation of the entire education offer aimed at qualifications and vocational training is the national qualification and vocational training system. The education system offers initial vocational training after the “Educación Secundaria Obligatoria” (ESO; the compulsory secondary education). The catalogue of professional training qualifications of the education system includes, besides the university education, three levels of education for professional skills acquisition in different sectors or areas grouped in professional families. Each title includes a full professional qualification. According to the national employment system (Ministry of Labour), vocational training is directed at the employed and unemployed people, consisting of training courses aimed at the modular acquisition and improvement of professional skills and qualifications in order to encourage partial accreditation.

In the Netherlands, qualifications that are clearly related to each other are grouped into 16 domains. The domain structure makes it possible for sectors to cooperate with each other and, thus, enables recognition of education and incorporation of innovative topics such as sustainability. The intermediate vocational education (MBO) system consists of three parts. The first part covers the basics, common knowledge, skills and attitude aspects of the various professions. The second is based on current core tasks of the chosen profession and the third is an elective, which regions are free to plan and develop as they deem fit. The Dutch Education Inspectorate monitors the quality of education and examinations held in certified schools.<sup>4</sup> The examination method depends on the preference of the regional training centre. A common examination is the aptitude test (contents: simulations, practical performance tests and work observations). The aptitude test regularly conducts audits in intermediate vocational schools. In the event that the expected quality is found lacking, the inspectorate issues a fine. If prescribed targets are not met within the allocated time, the inspectorate withdraws the school’s licence. Crebo is a central registration system for vocational trainings. All professional educational programmes recognised by the ministry are listed in Crebo.

The following table shows a short overview of the initial education systems and the associated mechanism of recognition:

Table 2: Comparison initial education

	Initial education	Recognition of initial education
<b>Austria</b>	<ul style="list-style-type: none"> <li>• Apprenticeship system: practical training in company + vocational school</li> <li>• Dual education</li> <li>• Duration: 2.5 to 4 years</li> </ul>	<ul style="list-style-type: none"> <li>• Final exam in apprenticeship trainings (practical and theoretical)</li> <li>• Apprenticeships are very well recognised</li> </ul>

<sup>3</sup> Equivalent to level 5 in the European Qualification Framework

<sup>4</sup> BUILD UP Skills – The Netherlands – Analysis of the national status quo, 2012

<b>Bulgaria</b>	<ul style="list-style-type: none"> <li>• Dual system of education combining theoretical and practical training in professional high schools with practice in companies</li> <li>• Modular structure</li> <li>• Duration: 4 to 5 years</li> </ul>	<ul style="list-style-type: none"> <li>• Final exam (theory and practice) leading to Certificate for Professional Qualification</li> <li>• Apprenticeships are very well recognised</li> </ul>
<b>France</b>	<ul style="list-style-type: none"> <li>• Apprenticeship system: practical training in company + vocational school → “four-party system”</li> <li>• Dual education</li> <li>• Duration: 2 to 3 years</li> </ul>	<ul style="list-style-type: none"> <li>• Final exam in apprenticeship trainings</li> <li>• Apprenticeships are very well recognised</li> </ul>
<b>Ireland</b>	<ul style="list-style-type: none"> <li>• Apprenticeship organised by SOLAS with modular character</li> <li>• Dual education</li> <li>• Duration: 2 to 4 years</li> </ul>	<ul style="list-style-type: none"> <li>• Exams about on-the-job and off-the-job competencies</li> <li>• Exams according to level 6 of the national framework of qualifications (= level 5 in the European Qualifications Framework)</li> <li>• Apprenticeships are very well recognised</li> </ul>
<b>Netherlands</b>	<ul style="list-style-type: none"> <li>• Modular structure: domain structure with 16 domains</li> <li>• 3 parts of MBO system</li> <li>• Dual education</li> </ul>	<ul style="list-style-type: none"> <li>• Examination: aptitude test</li> <li>• Recognised professional education programmes are listed in Crebo</li> <li>• Apprenticeships are very well recognised</li> </ul>
<b>Spain</b>	<ul style="list-style-type: none"> <li>• No dual education (only school-based form)</li> <li>• Modular system</li> </ul>	<ul style="list-style-type: none"> <li>• Exams according to National Catalogue of Professional Qualifications</li> </ul>

## 1.2. Further education

Not only initial education of craftspeople differs in the participating countries but also the opportunities for further education.

In France and Austria, as already described, there is a very clear and well-developed initial training for craftspeople. However, there are currently numerous barriers to overcome in terms of further education. On the one hand, the range of further education courses to improve energy skills is very limited and, on the other hand, objective trans-national recognition is hardly possible. In Austria, further education modules often do not require an entry qualification or do not end with a certificate of earned competencies on an international, comparable standard. Personal certification trainings are also offered by the Austrian Institute of Technology (AIT). The personal certification trainings are mainly in the field of renewable energies. However, since the market does not require these certificates, the courses are rarely attended.

In France, additional training for professionals on energy competencies is not compulsory. Once a craftsperson starts a business and has professional insurance, adding and validating extra competencies is not required, as he or her is legally considered as having the necessary knowledge to work properly. It is up to the craftsperson to increase his/her competencies if necessary and if he wishes. To do so, the craftsperson is free to participate in training courses given by recognized and qualified training organizations. It is also

possible to take online courses or to contact industrial manufacturers who elaborate products and technical solutions, while bearing in mind eventual associated risks. The only time a professional is obliged to undergo "mandatory" training to obtain recognition, is in the case where the craftsperson carries out work with a client who will subsequently apply for a tax credit from the French state. Only in this case, training is required to have recognition such as the RGE certification (Recognized Guarantor of the Environment: Reconnu Garant de l'Environnement).

RGE is a qualification scheme with a set of quality labels for professionals. The RGE scheme addresses several types of professionals: installers of renewable energy equipment; energy efficiency installers and consulting work related to energy efficiency. The scheme involves mandatory training of a technical manager, evaluation of the skills and on-site audit within 2 years of qualification. The qualification is valid for 4 years. This qualification is a voluntary process, but it enables its clients to benefit from financial support from the state.

Under these conditions, training is totally or almost entirely sustained financially by a joint organization. This means that the craftsperson pays for his training to the training organization, and is then reimbursed by a structure provided for this purpose.

In Bulgaria, knowledge related to the application of innovative energy-efficient solutions as well as decisions regarding the integration of renewable energy systems in buildings are not adequately addressed in the national further educational system. The same entities providing qualification services in the initial education system – professional high schools and vocational training centres licensed to operate in the professional areas of architecture and construction – also offer upskilling courses, which in many cases are courses leading to the so-called “qualification on part of profession”, or specialisation in a certain aspect of the respective professional occupation. These courses are usually shorter (40–60 hours) and more flexible, and most of the trainings focused on energy efficiency is designed in this way (e.g. specialisation in energy efficiency for workers qualified for a relevant professional occupation – building technicians, insulation installers, window installers, HVAC (Heating, Ventilation and Air Conditioning) technicians, etc.). Despite relative flexibility, short duration, blended learning approaches and access to certification, market demand remains very limited. A main reason for this is the general lack of market recognition and valuation of certification originating from the national qualification system (based on overall low appreciation of the quality of the VET services), as well as the lack of market demand for energy-efficient buildings in general. On the other hand, many product suppliers offer specialised courses, which are well attended and, despite their limited scope, make a significant contribution to the improvement of the general knowledge on energy efficiency among the workforce. In recent years, the Bulgarian Association for Insulation in Construction has also organised a number of training courses and published free training materials predominantly dealing with energy-efficient building renovation and supported by the Bulgarian Construction Chamber and EnEffect.

Regarding white-collar workers, further education opportunities are mostly offered by professional associations and chambers that are linked to international building standards or EU-financed projects implemented by various training providers. Unfortunately, there is still no continuous professional development system in place despite recent attempts of the Chamber of Architects in Bulgaria to set up at least a voluntary scheme. There are individual training courses organised by the Chamber of Architects and the Chamber of Engineers in Investment Design, the Association for Insulation in Construction and the Facade Engineering Association, but they are carried out occasionally and do not follow any qualification or certification system. On the other hand, certification on international standards such as Passive House, LEED (Leadership in Energy and Environmental Design) and BREAM (reflects the value in higher performing assets across the built environment lifecycle, from new construction to in-use and refurbishment) gain increasing popularity. Of course, trainings of product and technology suppliers are also well attended and popular among professionals. The certification and licensing of energy auditors, is governed by law and follows a fixed programme based on pre-defined units of learning outcomes; unfortunately, the supply has been interrupted for nearly seven years and none of the licensed universities is providing this service.

Numerous international cooperation projects implemented in Bulgaria has also contributed to the pool of knowledge regarding energy efficiency of buildings and to the number of trained workers and specialists, most of them being implemented by EnEffect with the support of the Bulgarian Construction Chamber and the

University of Architecture, Civil Engineering and Geodesy. Additional information about them is available in Section 3 below.

In Ireland, a number of the ETBs have offered upskilling programmes in nZEB and RES, specifically for construction craft workers and operatives, acknowledging the need to train further apprentices and craftspeople. Accreditation for these training programmes is predominantly through city and guilds accreditation with a small number of courses approved with support from the Sustainable Energy Authority of Ireland (SEAI) and the National Standards authority of Ireland (NSAI). Further courses recognised by SOLAS, SEAI, NSAI and city and guilds include:

- Gas Installation Safety (GIS)
- Gas Installation Domestic (GID)
- Domestic Thermal Insulation
- Air Tightness Installation
- Air Tightness Testing
- Ventilation – Design Installation and Commissioning
- Thermal Modelling
- Heat Pump Installations
- Biomass Installations

In Ireland, the National Framework of Qualifications (NFQ) provides a structure to compare qualifications from different awarding bodies across ten different levels based on nationally agreed standards of knowledge, skill and competence. This aids learners to make informed decisions about their qualification choices and to consider progression opportunities available to them on completion of training programmes. The NFQ also makes it easier for learners to demonstrate the qualifications that they hold or are studying for. A particular nuance of the Irish education system is the overlap between responsible authorities and providers related to awards positioned at Level 6 of the framework, the level at which the majority of awards to construction workers are made. Ireland has been actively seeking to establish links with other countries and education/training authorities to facilitate mutual recognition of Irish qualifications by international training collaborators and partners. Such mutual recognition is to facilitate mobility of labour, particularly in the EU countries. The instrument that will allow recognised qualifications in Ireland to be compared with the rest of Europe in the EQF is the Irish Qualifications Framework (QQI) for lifelong learning. A qualifications framework is an internationally recognised structure in which all qualifications are described in a coherent way so that they can be related and compared, and which serves to ease the movement of people throughout Europe while retaining lifelong learning and job opportunities in the international market. Moreover, Europass aims to facilitate the mobility of European learners and workers by making their skills and qualifications more easily understood across Europe. The Europass Certificate Supplement is provided to learners who hold a vocational education and training award. The Certificate provides additional information about the skills and competencies, the level of the Cert, entry requirements and access opportunities for progression to higher levels. Ordinarily, such information is not highlighted in the original award certificate. In Ireland, Europass Certificates are issued by FETAC.

In the Netherlands, the range of training opportunities is comparable to that of Ireland. Post-initial education is mostly organised by private training providers, which have a well-developed recognition system in the construction sector. A huge number of voluntary schemes are available for sustainable technologies. These schemes are in most cases not yet interdisciplinary across all trades, but in several schemes, elements from various crafts are added; especially schemes developed in the last two years. There is a link between initial and post-initial education. This link is provided in so-called professional competency profiles (BCP). In order to bring out the potential cross-fertilisation between post-initial and initial education, adjusted professional competency profiles (BCP+) have been drawn up in BUS\_N@W, a project of Intelligent Energy, for future professions aimed at realising (near) zero-energy buildings. The following figure clarifies the development of professions and the need to innovate (new knowledge in) BCPs on an ongoing basis. There are three knowledge levels:

1. existing knowledge, visible in activities aimed at maintaining the curriculum;
2. new knowledge, visible in the innovation of the curriculum;
3. Future knowledge, visible in activities aimed at discovering which new knowledge will be needed in the future.

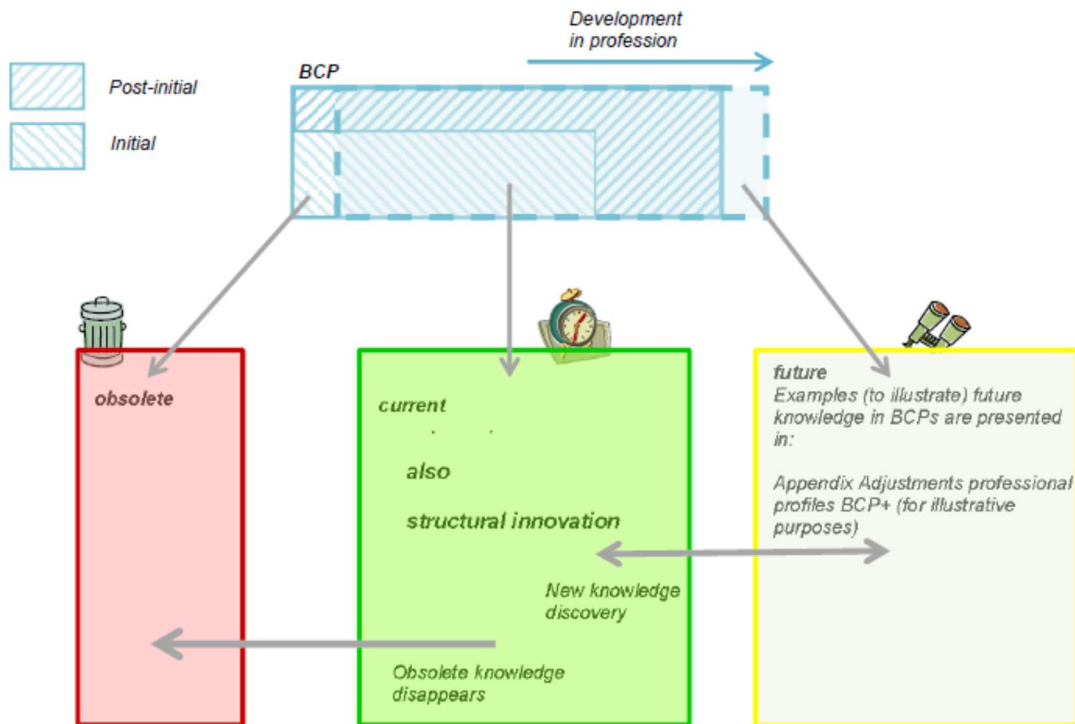


Fig 1: Development in professions

Future knowledge can be added to the VET curriculum in the form of 'choice parts' of 240 hours. Based on the BUS\_N@W output, four of these choice parts are now available in the regular education system. To implement this, initial education providers use, for example, training materials provided by post-initial training providers.

In Spain, three formal qualifications are recognised at University level: PhD, Master and Degree. Postgraduate studies and Master's programmes are only accessible to university graduates. The degrees directly related to the construction sector are attached to the "Engineering and Architecture" knowledge. This training can be completed with postgraduate courses specialised in different areas depending on the offer of each university. Specific subjects about energy retrofitting, efficiency and energy certification, sustainability, etc. are usually optional or included in postgraduate programmes. Both vocational training and university training cover some aspects related to energy efficiency, but do not include certified training related to the energy efficiency of buildings that addresses this issue globally. In addition to official paths, Spanish workers in the construction sector can opt for training in energy efficiency through courses offered by agents in the construction sector on these topics. These types of courses are normally aimed at white collars, with few examples of off-the-beaten-track training in these subjects for blue collars. Even if it is assumed that there is a wide range of offers, this training is often fragmented, lacks precision and has the great disadvantage of not having a certification system. Moreover, there is a voluntary personal certification in Spain, which can be chosen by professionals who wish to reinforce confidence in their services. Personal certification must be carried out based on the international standard ISO 17024, which establishes the requirements for the process of evaluation and certification of professionals, as well as the conditions that the entities offering this certification must meet. Certification entities that offer this professional distinction can in turn increase confidence in

their certification activity by obtaining the ENAC<sup>5</sup> accreditation (National Accreditation Entity) for certification schemes of people that they have implemented. In relation to the personal certification on energy efficiency in buildings, there are examples of different scopes mainly focused on energy efficiency certification and energy auditing. There are also examples of personal certification linked to the supply of sustainable certification of buildings. For example, BREEAM<sup>6</sup> and BES Oficina<sup>7</sup>, both offering building certifications related to sustainability, certify professionals proving that they know their certification system and can carry out the evaluation of the requirements. This type of recognition is penetrating the market as a more agile system of recognition than those provided by public organisations, as it is developed in the private sphere and recognised by a state agency, reducing the time for the creation of new certifications and allowing better market adaptability.

The following table shows an overview of the further education and recognition in each country:

Table 3: Comparison of further education systems and mechanisms for recognition of skills

	Further education	Recognition of further training
<b>Austria</b>	<ul style="list-style-type: none"> <li>• Voluntary further education by private providers</li> <li>• Voluntary trainings with personal certification according to ISO 17024</li> </ul>	<ul style="list-style-type: none"> <li>• Hardly no recognition of upskilling courses</li> </ul>
<b>Bulgaria</b>	<ul style="list-style-type: none"> <li>• Voluntary further education by public and private providers</li> <li>• Courses on international certification schemes and by product suppliers</li> </ul>	<ul style="list-style-type: none"> <li>• Hardly no national recognition of upskilling courses</li> <li>• International certification and certification by product suppliers possible and valued</li> </ul>
<b>France</b>	<ul style="list-style-type: none"> <li>• Voluntary further education by private providers</li> </ul>	<ul style="list-style-type: none"> <li>• Hardly no recognition of upskilling courses</li> <li>• RGE certificate</li> </ul>
<b>Ireland</b>	<ul style="list-style-type: none"> <li>• Voluntary further education organised by private providers</li> </ul>	<ul style="list-style-type: none"> <li>• National: recognition according to National Framework of Qualifications</li> <li>• International: recognition according to Irish Qualifications Framework (QQI) for lifelong learning and Europass Certificate</li> </ul>
<b>Netherlands</b>	<ul style="list-style-type: none"> <li>• Voluntary further education by private providers</li> </ul>	<ul style="list-style-type: none"> <li>• National: well-developed recognition system (especially in the installation sector)</li> </ul>
<b>Spain</b>	<ul style="list-style-type: none"> <li>• Voluntary trainings with personal certification according to ISO 17024</li> </ul>	<ul style="list-style-type: none"> <li>• Hardly no recognition of upskilling courses</li> </ul>

<sup>5</sup> <https://www.enac.es/>

<sup>6</sup> <https://breeam.es/recibimos-la-acreditacion-de-enac-para-certificar-asesores-breeam/>

<sup>7</sup> <https://www.five.es/certificacion-edificios/oficinas/>

	<ul style="list-style-type: none"> <li>• Voluntary further education by private providers</li> </ul>	<ul style="list-style-type: none"> <li>• Recognition according to National Catalogue of Professional Qualifications</li> </ul>
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## 2. Problems and challenges with recognition of energy efficiency skills

As already described, further education does not always work in most countries and its recognition could be expanded in all countries. The following chapter summaries actual problems and challenges with regard to further education and recognition of energy skills in the partner countries. By analysing the problems and challenges associated with recognising energy skills in the partner countries, a base for the further identification of possible solutions can be created.

### 2.1. Austria

Looking at building construction in Austria, it becomes apparent that highly complex construction tasks are performed by semi-skilled workers. Even though the market offers a number of certification and education schemes, a lack of skills and knowledge is noticed when it comes to the implementation of the nearly zero-energy building standard. In general, a broad offer on further education in energy efficiency and renewable energy is available in Austria, but the specific benefits of the trainings are often not clear to the target audience (especially blue-collar workers).<sup>12</sup> In addition, product suppliers distort competition by offering free product-oriented trainings.

Unfortunately, Austrian construction companies show little willingness to provide further education to their employees by sending them to courses for the following reasons:

- Well-qualified employees ask for higher salary
- Employees are constantly needed on site
- Continued work during the winter months becomes possible because the long and cold winters are diminishing
- The travel distance to possible training locations is too far
- The benefits of the offered trainings are not clear enough

Moreover, it is very difficult to motivate blue-collar workers to participate in courses. A main reason for the demotivation of craftspeople is that attending further education is voluntary in Austria and is not required by the market.

The course content and its benefits should be shown more transparently. However, training providers are often not willing to increase transparency with regard to the contents of their courses due to fear of competition. Also, the opportunity of course evaluations is partly rejected as providers are afraid of losing clients in case of poor results.<sup>12</sup>

Comprehensive quality management is necessary for the certification of training institutions (e.g. following ISO 90001). Unfortunately, this process is complex and cost-intensive, especially, for small training providers. Nevertheless, this is often a precondition for Public Employment Service funding. Moreover, training providers are partly not willing to increase transparency with regard to the contents of their courses due to fear of competition.

The implementation of building requirements in connection with the nearly zero energy building standard is also quite complex in Austria (there are nine independent federal states with nine different valid building regulations). Therefore, trades react slowly to new market requirements and only take action if specific procedures or system changes are prescribed and quality-controlled.<sup>12</sup>



Last but not least, trades have little understanding of the work of other trades. Cross-craft awareness is not part of the initial curricula of the different trades. In the actual tendering process for the construction of buildings, each trade is considered individually and not in connection with other trades.<sup>13</sup>

## 2.2. Bulgaria

While the national qualification system provides well-structured and relatively flexible certification opportunities, market recognition of and demand for energy efficiency skills for both blue-collar workers and specialists do not function properly due to three main factors:

1. perceived low quality of the vocational training services by both public and private training providers within the national VET system;
2. lack of a continuous professional development system in any of the relevant professional areas;
3. Lack of market demand for quality energy-efficient buildings.

The low level of trust in training providers is based on the continuous practice of issuing certificates without proper quality assurance and control of examinations (courses usually being fully paid by public funds and free for workers), resulting in strong dissatisfaction of employers. The lack of CPD (Continuing Professional Development) requirements, even voluntary ones, leads to fragmented and unstable supply of training services, often driven only by available financing from national or international sources. However, the most important reason remains the lack of market demand for quality nZEB and, to a certain extent, the failure to enforce legal requirements, which leads to a reactive attitude of most of the actors in the value chain and an underestimation of the importance of knowledge and skills related to improved energy efficiency.

Overall, the existing training schemes still need improvements, but this is especially relevant for the practical part of the courses. There are several outstanding barriers pertaining both to the system of vocational education and training and to stimulating market demand for nZEB-related training. They are structured in the following main groups:

### **Institutional barriers:**

As in most EU countries, both the educational and the construction sector are largely fragmented, and numerous stakeholders are involved in the decision making process – especially when energy issues are at stake. The coordination between the ministries, governmental agencies, accreditation bodies, the educational sector, VET providers, industry group representatives, energy service suppliers, NGOs, etc. is extremely complicated. While the national qualification platform developed under the BUS initiative played a major role in the identification of the key issues, there are still many obstacles in implementing streamlined optimisation measures, which is exemplified by the fact that a national system for forecasting required new skills or CPD requirements and scheme are still missing. Qualification registers and Skill-Passport are only a good intention and in practice one that is met with strong resistance from the mainstream construction sector. In recent years, there have been discussions about the formation of a sector council under the leadership of the Bulgarian Construction Chamber and the Ministry of Education and Science. However, whether this will happen in the foreseeable future remains to be seen.

With regard to barriers in the VET system itself, the lack of financial and human resources for continuously updating State Educational Standards and their further development in terms of units of learning outcomes is also a problem. There is also a definite lack of adequate professional orientation related to the construction sector, as students often do not recognise the attractiveness of the professions in this domain due to its very poor public reputation.

There are also a number of barriers related to strategic planning and the legal frameworks, as already mentioned above. The national nZEB definition is still not in force. As of 2021, the required minimum class of energy efficiency will remain B (compared to class A as well as 55% of energy coming from renewables according to the definition), which obviously does not contribute to the demand for nZEB training and education. In addition, renovation programmes remain unambitious. There is no clear commitment to training

and education in the draft national Long-term renovation strategy, and there are no requirements for skilled labour in public procurement legislation and practice.

#### **Structural barriers:**

In Bulgaria, the overall educational level of unqualified and low-qualified workers is extremely low. In most cases, basic literacy skills are missing, and obviously, digital skills are far underdeveloped. This obviously poses a significant problem in the face of mass-scale training efforts and could only be overcome through practical training on-site, led by peers or direct supervisors of the workers in question. However, this requires a comprehensive reorganisation of the work of contractors, and possibly upskilling and pedagogical training of technical staff, which cannot only be triggered by the (hardly convincing) market trends.

Moreover, there is a lack of active training providers willing to broaden their portfolio with nZEB-related training. In addition, despite the major effort to train high school teachers in the whole country in 2016, the teaching staff in both high schools and vocation training centres would require upskilling, especially in terms of practical training approaches.

#### **Financial barriers:**

On the one hand, the continuous lack of financing in the educational system, outdated facilities and equipment and the underpaid labour of the pedagogical staff hinder the development of vocational training and educational practices and institutional framework. On the other hand, however, significant resources have been invested in publicly financed upskilling programmes in recent years. They, however, do not reach the construction sector in general and energy efficiency training schemes in particular, which is a clear indication of the inactivity of VET providers and/or limited market demand. In that respect, it has to be acknowledged that employers often fail to recognise the need to enhance the energy skills of their employees and tend not to invest (mostly time, as usually courses are free or very affordable) in upskilling or qualification courses.

#### **Barriers to participation:**

Participation in nZEB-related training schemes is usually motivated by three major factors: operational legal requirements that have to be respected, market demand for high-quality energy-efficient buildings (possibly stimulated by dedicated public financing), and, from the point of view of the worker/specialist, increased employment opportunities at home or abroad. In addition, the training offer itself should be sufficiently attractive offering time flexibility, practical value and quality of the training service, and national and/or international certification. Unfortunately, most of these elements are still missing in Bulgaria, as the legal requirements are still not enforced, market demand is driven by price factors and there are no public incentives for excellent energy performance, and certification under the national educational framework hardly gives any employment advantages. Despite recent advancements, the training offer still needs to be optimised, mostly in terms of shortening and “modularising” of the training courses, which would lead to gradual acquisition of qualifications, introduction of blended learning methods and a strong focus on on-site practical training, also improve training facilities, skills of the teaching staff and the quality assurance of the training and educational services, as well as possibly align and combine national and international certification schemes.

### **2.3. France**

There are numerous interrelated challenges impeding skills enhancement for building industry professionals<sup>8</sup>:

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<sup>8</sup> BUILD UP SKILLS France- Endorsed version, 2013

Craftspeople and company directors believe that the market is not adequately “mature” to encourage them to build up skills in energy efficiency (mainly in renovation) and renewable energies. One reason for this is that the lowest price always wins over the best quality on the market. Moreover, many craftspeople and employees have little time to invest in building up their skills.

The training offered is usually very limited and not tailored to the needs of craftspeople and companies. Moreover, the majority of instructors have not yet acquired all the necessary skills to train building site professionals in the new practices. Moreover, legislation is complex. In addition, “the global approach” comes up against specific obstacles like questions of liability and insurance.

RGE related trainings have many limitations:

- Trainings are overwhelmingly theoretical.
- It only takes one person to be trained for the company to be referenced.
- This person can be a technician, a worker, or an administrative agent.
- A theoretical questionnaire is what it takes to validate the training.

Stimulating market competencies in France is still a purely theoretical and financial matter.

Furthermore, and in order to keep the RGE label, the craftsperson is obliged to meet administrative and technical requirements annually. Qualibat also could make site visits to carry out audits. In fact, theoretical training is not a substitute for practical training to improve the quality of implementation.

Although trainings and developing new skills is far from being sufficient even if necessary and essential. Having a qualified workforce is vital for the upcoming years and companies need badly qualified professional.

For instance, we could consider two students from different schools but graduating from the same course. Theoretically, these two student have the same level and have developed the same skills. However, this hypothesis is mainly misleading, as level and skills of each of the two will depend mostly on social and human factors, the willingness of each to learn, the passion imparted by teachers, among others.

## 2.4. Ireland

One of the main challenges in Ireland is the difficulty for end users (homeowners and procurers) to identify construction workers who are upskilled in energy efficiency topics.<sup>9</sup>

### **Institutional barriers:**

In Ireland, numerous stakeholders are involved in the education sector. There is a large number of governmental departments and agencies, accreditation bodies, training authorities, training providers and industry group representatives that are directly or indirectly involved in the implementation of energy policy for the built environment. The coordination between them has to date been a great challenge.<sup>10</sup> It is hoped that the launch of the retrofit taskforce (as part of the Climate Action Plan) and of the National Retrofit Office within SEAI will at least partly address this issue.

While a standards-based apprenticeship system is in place for craft workers, the reality is that workers are rarely required to produce evidence of certification, particularly at SME (Small and Mid-sized Enterprise) level. Moreover, no licensing system exists for those operating as building contractors. Contractors and subcontractors may set up as sole traders or register as companies without any vetting of competence or qualification.<sup>10</sup>

### **Structural barriers:**

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<sup>9</sup> <https://enterprise.gov.ie/en/Publications/Publication-files/Building-Future-Skills.pdf>

<sup>10</sup> BUILD UP Skills –IRELAND Analysis of the national status quo, 2012

In Ireland, there is a high proportion of migrant workers in the construction sector. Therefore, language barriers are to be considered in trainings. There is a lack of training providers and educators and trainers may require upskilling in the majority of cases.<sup>10</sup>

The structure of the building sector obstructs further education of apprentices. Apprenticeship training content is quite general, however, companies are increasingly using sub-companies with special focuses.<sup>10</sup>

#### **Financial barriers:**

Financial support of the government for programmes of renewable energies and energy efficiency depends on the economic situation. Although there is currently little financial support provided to those in employment for upskilling, in recent years, there have been a number of training funds administered through the trade unions and Skillnets that have subsidised employee participation. Moreover, employers often do not realise the real demand for energy skills. Therefore, there is a lack of investment in trainings in this sector.

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SMEs may find it particularly restrictive to allow employees to attend training during working hours, because absence from work is believed to reduce productivity levels and lead to missed deadlines. This is one reason why employees are often not given time or are not encouraged to attend trainings.<sup>10</sup>

#### **Barriers to participation:**

The main reason why a construction worker wishes to engage with an upskilling programme is to improve their prospects of getting or maintaining employment or of higher paid employment. Unless there is a focused promotion of this sector as an important area of employment, the demand for training is likely to remain low. Moreover, the awareness of the relevance for the construction sector is missing.

In Ireland, a big problem is the vetting of competence or qualification of companies in the building sector. Only a regulation for recognition of domestic gas installation and electrical installation has been introduced. This was primarily due to health and safety concerns rather than work quality assurance. However, related training programmes have since seen strong participation. This is a major motivational factor for participation in training schemes. The affect has been twofold: firstly, legal requirements for qualifications relate to access to employment opportunities, and secondly, there is greater awareness of the relevance of training.

Moreover, the introduction of a minimum share of renewable energy for space heating/hot water or electricity generation in dwellings in the Building Regulations of 2008 and the current one of 2019 also had an impact on training demand.

## **2.5. Netherlands**

In the Netherlands, most recognitions are voluntary. Quite a number of these recognitions originate from RES obligations, for example, heat pump systems, solar PV systems, solar hot water systems, biomass stoves and boilers. Some schemes come from cooperation between the installation sector and suppliers, for example, recognition for ventilation technology. Several originate from branch organisations in order to deliver quality. Only a few are obligatory by law (e.g. geothermal heat pump systems, energy labelling (EPBD)). This fragmentation is seen as a weak point. As the energy transition for sustaining the built environment has to address a large number of different technologies, earning certificates and receiving audits for the formal ones can become quite costly, especially for SMEs.

Another weak point is that voluntary recognition does not always mean that its value is perceived, which leads to the statement: If it does not add value, why should I earn the recognition and invest in it?

Skill sets in existing recognitions are often not up to date. Due to the fragmentation, quite difficult governance processes related to recognitions, innovations and ways to deliver better quality are often neglected for years.

A final challenge with regard to recognitions is moving from working in silos (where teams or companies work towards the same objective, often in close vicinity but without sharing information) to working together on sustaining the built environment. As in most cases, each silo has its own infrastructure, governance bodies and practice related to the recognition and certification of persons and/or companies.

A weak point, but at the same time an opportunity is the lack of recognition of prior learned skills with regard to sustaining the built environment. People working in the relevant value chain develop many of their skills on the job, for example, in master-apprentice relationships and between colleagues and self-employed people. However, these skills formally acquired on the job do not count and are therefore not properly valued.

## 2.6. Spain

In Spain, there are no requirements to work as a blue-collar worker in the construction sector. The fact that even vocational training is not required means that the official training offer is not in high demand. Public administrations increasingly demand a level of training for the staff of the companies that present themselves in public tenders, which favours the rise in the demand for this training or at least the recognition of the skills based on experience.

The combination of the official training offer (vocational training + national qualifications + university studies) and the professional card works well as a system of recognition of skills in the construction sector. However, this does not imply that skills related to energy efficiency are recognised. Skills are being recognised either related to safety issues or specifically related to a specific craft (bricklayer, plumber, architect, engineer, etc.), with the exception of some specific aspects included in vocational training degrees or undergraduate degrees.

Another problem in the construction sector in Spain is gender diversity and age distribution. The highest percentage of employed women in this sector is mainly concentrated in the age group between 35 and 54 years (69% of the total), while the age group with the least representativeness is between 20 and age 24 (a circumstance that is repeated in the case of men), which reflects that construction fails to attract young talent. Regarding the area or position they occupy, the report highlights that 46% are dedicated to specialised construction activities; while 41% are employed in the construction of buildings, the remaining 12% are civil engineers. In relation to data on work-life balance, while part-time workers in general account for 3.2%, women in this work situation represent 22% of the building sector.<sup>11</sup>

Both vocational training and university training include some aspects related to energy efficiency, but not certified training with regard to energy efficiency of buildings that addresses this issue as a whole. In addition to the official paths, workers in the construction sector can opt for training in energy efficiency through courses offered by agents in the construction sector on these topics. These types of courses are normally aimed at white collars, with few examples of off-the-beaten-track training in these subjects for blue collars. Even if it is assumed that there is a wide of offers, this training is often fragmented, lacks precision and has the great disadvantage of not having a certification system.

Voluntary certification of people that professionals, wishing to reinforce confidence in their services, tend to prefer is penetrating the market as a more agile system of recognition than those provided by public organisations, as it is developed in the private sphere and recognised by a state agency, reducing the time for the creation of new certifications and allowing better market adaptability.

Apart from the economic crisis, blocking of finances and lack of demand are economic barriers for the building sector. As a result, construction companies do not want to offer their workers the opportunities for special trainings.

An administrative barrier is that in a paralysed sector with a focus only on short-term decisions and complex sub-activities, training investment appears uncertain. Moreover, there is insufficient training for the lowest qualification levels, and where available, it is not adequate. In this regard, we have to consider that training is created in relation to what is demanded, and currently, these courses do not seem to be compatible with the needs that experts have identified for the sector. The administrative delay caused by the bodies in charge

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<sup>11</sup> Report Women in Construction, 2020

of publishing qualifications can be detrimental to the training. There is another additional problem due to the insufficient number of certified centres.

In most of the smaller production units of the sector, traditionalism and low industrialisation are predominant features, unlike in large companies. In smaller companies, there are less training opportunities for workers than in big companies. The sub-contracting of third parties to perform different activities brings a marked division of tasks, which, even if it increases productivity, also implies a risk of fragmenting control over the execution of each of the phases and losing the project's global view, with the resulting drop in worker involvement. It is quite likely that the high degree of sub-contracting hides precarious jobs and workers' low qualifications. According to experts, large building firms and developers had a central part of the responsibility as regards construction and its current issues in Spain. In the few cases in which the Technical Building Code (CTE) has been applied in the building of tower blocks, these norms have been complied with only at minimum levels, merely responding to basic obligatory specifications. The reason for this situation is the lack of demand. This means that because energy efficiency and sustainability do not create added value and a stand-out element for building firms and developers, they will not invest beyond what is demanded by the law and purely for reasons of profitability.

The building industry is traditionally composed of workers who have failed at school, which, in general, causes lack of initiative and apathy regarding specialisation. Workers belonging to the lowest sector of the industry do not have the habit or motivation to improve their training. This is why it would be more than desirable to enforce energy efficiency training that mostly covers the lowest qualification levels where training is limited due to sociocultural causes.

Because of the economic situation that the country and this sector in particular are going through at the moment, training does not immediately translate into improvements in employment, and thus there is little motivation among workers. These motivational issues can be observed in individuals, SMEs and micro-SMEs within the sector. Moreover, there is often a language gap, which makes trainings particularly difficult.

## **2.7. Summary on problems and challenges**

The main challenge to recognise energy efficiency skills is that recognition of upskilling trainings is voluntary in all partner countries. Also, the government and customers do not require recognised craftspeople. For these reasons, there is no understanding among craftspeople and companies for attending further education trainings.

Moreover, the courses are rarely used because they are voluntary in most partner countries. In all partner countries, the low motivation of the craftspeople plays a major role. In addition to the lack of motivation to attend a course, the craftspeople have a lack of understanding of the benefits of further education and no time.

Another problem is that well-trained craftspeople are not required at present because there is no market demand for nZEB. In general, the following applies in the construction sector: low price over high quality. For this reason, the companies do not want their employees to attend training courses, as this would result in higher salaries. Also, craftspeople cannot work on site while attending a course. Therefore, craftspeople are often not allowed to take part in time-consuming training courses. Moreover, in the building sector, knowledge is often passed on within the company through experience. This acquired knowledge can lead to an improvement in quality, but is not recognised.

In Austria, the low transparency of the offered training courses also plays a role. Before attending a training, the craftspeople cannot clearly see what the contents and benefits of the courses are and also have no information about the possible recognition. Unfortunately, the training providers are not willing to increase transparency because of market competition.

Another problem is that many courses in Bulgaria are of very poor quality and participants cannot benefit from them. The trainers for these courses are also usually poorly trained. In Bulgaria, certificates are often issued by training providers without any quality assurance or control over the exams taken by the participants. As a result, there is very little trust in training providers and training offers. Moreover, in Bulgaria, the overall educational level of unqualified and low-qualified workers is extremely low. In most cases, basic literacy skills

are missing, and obviously, digital skills are far underdeveloped. This poses a significant problem in the face of mass-scale training efforts.

In Bulgaria, Spain, Ireland and France, only a small number of courses is available in the area of energy efficiency. In Spain, there are no certificates for renewable energy system trainings and therefore, there is no recognition of these skills. Moreover, in Bulgaria and Spain only a small number of competent training centres exist.

Furthermore, in Spain and Ireland, competencies and qualifications in the construction sector are rarely checked. In Ireland, homeowners cannot identify craftspeople who are upskilled.

In France, RGE related trainings have many limitations. For example, the trainings are overwhelmingly theoretical, it only takes one person to be trained for the company to be referenced and the final examination is only a theoretical questionnaire.



### **3. Previous approaches of recognition of energy efficiency skills and effects on stimulating market demand**

As described in the previous chapters, there are major challenges in connection with the training and recognition of competencies of craftspeople in the field of energy efficiency. In this section, possible solutions that have already been identified or developed in the partner countries as well as new possible options to overcome these challenges are summarised.

A possible solution to motivate blue-collar workers to participate in further education courses is to offer them tailored in-house trainings and reduce the course duration to a maximum of one day. Furthermore, comprehensive quality management for the construction of nZEB, clear descriptions of further education training contents and raising awareness for the importance of further education on the market are required. To ensure high quality trainings, evaluation of available trainings, collaboration between training providers and the dissemination of cross-sector knowledge are essential.

To boost market demand for energy efficiency skills, the following actions are necessary:

- Raising awareness for the connection between quality of execution, low operating costs, and increased living comfort
- Increasing quality requirements of end consumers in the field of energy efficiency
- Increasing the control over executed construction work with focus on energy efficiency
- Promoting the importance of a heightened focus on energy efficiency in the building sector as a central point of a future-oriented, sustainable construction method
- Convincing construction companies of the benefits of well-skilled employees
- Promoting the benefits of collaboration between the crafts
- Further spreading of best practice projects in the field of energy-efficient building construction
- Informing about the benefits of inspections and evaluations in connection with energy efficiency
- Driving lead contractors to develop a demand for work in new construction and renovations that takes into account the "energy transition" and gives priority to the quality of offerings rather than the single price criterion
- Improving transparency for lead contractors and helping them identify firms that have acquired the skills with which to satisfy the new requirements of quality and obligation of results
- Encouraging quality through market recognition
- Establishing training and consultation centres for both building professionals and end users, providing various capacity building services stimulating the market demand for quality nZEB
- Enabling the introduction of qualification requirements in public procurement projects

To counteract the problem that many workers and companies are not motivated to attend further education courses, the following activities could lead to solutions:

- Developing persuasion strategies for craftspeople to participate in further education trainings
- Explaining the trainings in detail to improve the reliability of training courses
- Implementing collaborations and cooperation between small training providers to enable standards for mutual recognition of certificates
- Promoting cross-craft trainings
- Expanding the regional infrastructure to facilitate access of craftspeople to further education
- Enhancing recognition schemes to boost demand for upskilled craftspeople
- Tailoring courses as part-time or quasi part-time trainings to facilitate access for those currently in employment and increase the number of participants



- Involving product manufacturers and suppliers in the training offer
- Integrating national and international certification schemes
- Developing qualification registers and Skill-Passportsystems endorsed by the relevant branch organisations and national authorities to promote competitiveness, employability and career growth opportunities of construction workers

In the following chapter, approaches from already completed BUILD UP Skills projects, which are exactly aimed at implementing the activities mentioned above, are summarised and evaluated. Moreover, the effects of the project results on the recognition of energy skills on the market are shown.

### 3.1. Austria

In Austria, the general further education offer in the areas of energy consulting, energy efficiency and renewable energies seems comprehensive at first sight. However, considered more closely and with respect to the target group of blue-collar workers, it becomes clear that the number of courses focusing on energy efficiency is rather limited.

In the following, the currently most relevant further education trainings in the building sector with a focus on energy efficiency are listed:

- Certified installer of ETICS (external thermal insulation composite system) (Zertifizierter WDVS-Fachverarbeiter): Education for this certificate, which takes 40 hours, is offered by the training institute “Bauakademie Österreich” and includes certification by an external authority.<sup>12</sup>
- Flat roofing and waterproofing: The Institute for Flat Roofing and Waterproofing (IFB) started to offer qualification programmes 15 years ago and trains about 300 participants per year, which amounts to approx. 2,000 qualified persons at present.<sup>12</sup> Companies use training certificates from the IFB as a quality label for their services and can be listed in the IFB's quality database.
- HVAC installer: The Austrian Institute of Technology (AIT) provides trainings for certified HVAC installers according to the Guidelines BGBl. 2, part II “Qualification and certification measures in connection with stationary refrigeration and air conditioning systems and heat pumps”. These courses are voluntary and not necessary to install components. By participating in total eight training modules developed by this institute and passing an exam, the trainee fulfils the requirements for obtaining a personal certificate according to category II. Category II-certified personnel are authorised to install, maintain and repair the refrigerant of systems with a capacity of less than 3 kg or hermetically sealed systems of less than 6 kg. Depending on the type of refrigerant and the design of the heat pump or refrigeration system, this corresponds to approximately 20 kW cooling or heating capacity. As already described, craftspeople are not committed to attend such courses. The modules consist of five teaching units, 45 minutes each, and are blocked in recurrent order and offered on individual dates.
- Energy consultant: Energy consulting is not a regulated trade in Austria, and there is no certification scheme for this profession. Since the early 1990s, ARGE EBA (Arbeitsgemeinschaft EnergieberaterInnen Ausbildung; Working Group Energy Consultancy Traineeship) has been offering trainings for energy consultants. The task of ARGE EBA is to guarantee quality assurance and further development of the high quality training for energy consultants. ARGE EBA traineeship enables differentiation among energy consultants on the market and ensures specific knowledge and consulting capabilities of their graduates. ARGE EBA exists in all Austrian provinces and is coordinated by the respective energy agencies of the provinces. The provinces are responsible for the course, but the “Units of Learning Outcomes” (ULOs) are the same for all. As a result, it is mutually recognised across Austria. An oral board examination and national coordination meetings ensure its recognition.<sup>12</sup>

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<sup>12</sup> NEWCOM D2.1, 2018

- Window installation: Well-known window manufacturers (VELUX, JOSKO...) in Austria carry out their own product-specific training courses, which they want to make compulsory for fabricators of their windows and doors. The courses correspond to the compulsory window installation standard ÖNORM B 5320, but are yet not compulsory.

### **BUILD UP Skills CrossCraft**

The project BUILD UP Skills CrossCraft (national implementation of the second pillar of the BUILD UP Skills initiative) was successfully completed in 2016, including the development of different training modules. One of the specifics of the developed courses was that they were not only held in classrooms, but also directly at construction sites. The main teaching content of the courses was the importance of air tightness of the buildings envelope, the interaction between crafts and the prevention of the most common construction errors. The following figure shows the developed training modules:<sup>13</sup>

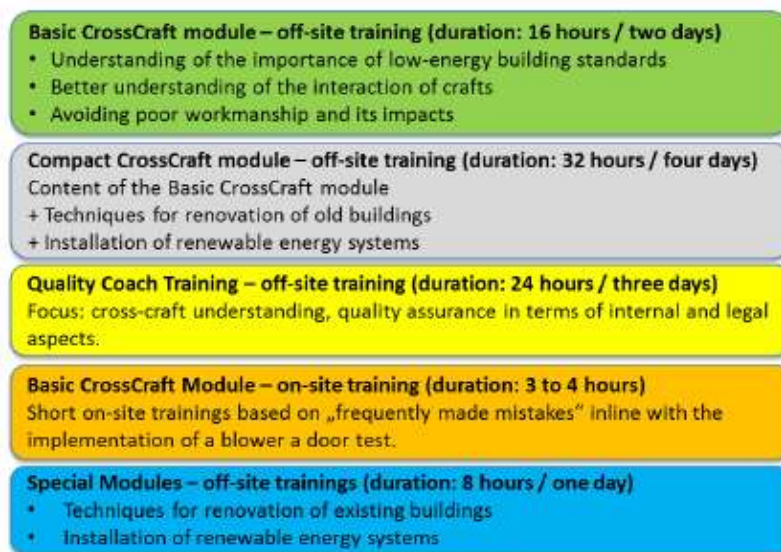


Fig 2: Developed modules<sup>13</sup>

### **CraftEdu**

The goal of the European project CraftEdu was to set up national qualification and training schemes for craftspeople in the Czech Republic and develop further offer of training courses in Slovakia, Austria and Bulgaria. During the project, two main training programmes were developed for Austria:

- nZEB Training Programme for Carpenters – thermal insulation with blow-in insulation of renewable materials: The target groups are craftspeople and on-site workers, as well as persons interested in obtaining professional knowledge and professional skills relevant to the construction of nZEB and/or energy renovations of existing buildings according to the nZEB standard, especially in the field of blow-in insulation, including related topics of air tightness. The graduate is a qualified construction professional able to work independently and has the appropriate knowledge and skills in the field of nZEB (construction of new nZEB and energy renovations of existing buildings according to the nZEB standard).<sup>14</sup>
- Certified water proofer – basics (Flat roofing and waterproofing): The target groups are craftspeople with the following pre-qualifications: proof of at least one year of construction site experience or positive completion of a current (within the last two years) IFB-certified manufacturer-practice-processing training course. The training scheme was developed in coordination with the European Project NEWCOM.<sup>14</sup>

<sup>13</sup> BUILD UP Skills CrossCraft

<sup>14</sup> CraftEdu Deliverable 2.5; 2019

## **NEWCOM**

The European Union project NEWCOM emerged from the BUILD UP Skills initiative provides solutions to improve and maintain energy efficiency in the building sector. NEWCOM supports the professional execution of nearly zero-energy buildings (nZEB), on the one hand, by developing new training modules for professionals, and on the other hand, by preparing a basis for (European-wide) mutual recognition of competencies via a database that allows describing and comparing expert qualifications.

In order to support the quality of sustainable buildings, NEWCOM developed several nZEB training schemes. To ensure maximum flexibility, the trainings are designed in modules so that they can be used both as stand-alone units and as a complement to already established courses. Based on the current needs of the partner countries for professionals in the fields of flat roof and structural waterproofing, comfort ventilation and quality assurance of near zero-energy buildings, specific training modules have been prepared.

A competence database was created with the aim of making acquired skills comparable across Europe. This database provides a basis for mutual recognition of skills of professionals throughout Europe. The competence database links the description of competencies gained by attending a relevant course with the expert. Furthermore, a professional card can be issued on the basis of the acquired skills. The developed system can be expanded to almost any field of work and used throughout Europe.

Moreover, identification of market barriers to the implementation of (European-wide) mutually recognised training schemes for professionals in the building sector and ways of overcoming these barriers to create the needed market demand was a priority topic that was worked on during the whole project.

### *Effects on stimulating market demand*

At present, the mentioned approaches have only minor effect on raising market demand for energy efficiency. The main reason for this is that the courses are voluntary.

Nevertheless, the market was easily stimulated by the training approaches of the project BUILD UP Skills CrossCraft, as the building owners became more interested in blower door tests.

Because the approaches of the project NEWCOM were not completed until the end of 2020, the results have not had the time to stimulate the market so far. It is expected, however, that this approach of making acquired skills comparable across Europe will help stimulate market demand for energy skills in the future.

Moreover, since the beginning of 2021, every new building and each building undergoing major renovation needs to match raised standards according to energy efficiency (nZEB-standard). Furthermore, more building owners, especially in the public sector, are asking for new buildings and renovations to be performed according to the quality label “klimaaktiv building standard”.

Last but not least, policy makers have to enforce the reduction of greenhouse gas emissions to reach their climate protection goals. One of the main ongoing Austrian initiatives in this area (besides the already mentioned raised building standards in 2019) is the national campaign “Get out of oil” (Raus aus dem Öl). This initiative leads to the prohibition of the installation of new oil boilers in new buildings and supports the switch from fossil fuels to renewable fuels by subsidies.

## **3.2. Bulgaria**

### **BUILD UP Skills EnerPro**

BUILD UP Skills EnerPro is the Bulgarian project under the second pillar of the BUILD UP Skills initiative and is considered as the founding block for the efforts to stimulate recognition of energy efficiency and renewable sources skills in the building sector. Implemented in cooperation with the responsible governmental agency (the National Agency for Vocational Education and Training) and five public and private VET providers, representing both professional high schools and vocational training

centres, the project set up the scheme for certification and recognition of skills in the topical area. It fully exploited the opportunity provided by the national legislation for shorter and more flexible upskilling/specialisation courses “on part of profession”, resulting in a nationally recognised certificate for qualifications. The project developed ten distinctive training programmes (three on energy efficiency topics and seven on RES) with a duration of 40 to 60 hours, as well as MS PowerPoint presentations in Bulgarian freely available to all interested VET providers by signing a cooperation agreement. More than 100 trainers were trained in dedicated courses in seven Bulgarian cities. The programmes were piloted in each of the five participating training centres, resulting in more than 400 trained workers. In addition, the project set up a partnership with the Germany-based Passive House Institute, developing capacities for offering of the certified training programmes, and eventually resulting in incorporating passive house-relevant learning outcomes in the state educational standards.

### **Train-to-nZEB**

The project Train-to-nZEB was a logical continuation of BUILD UP Skills EnerPro, enabling the supply of trainings under the new programmes by equipping modern training centres with demonstration models and practical training facilities. Further train-the-trainer courses were delivered, structured in two parts. The first part of the course was held in Ireland for selected trainers from all project partners. In the second phase, the already trained trainers were requested to deliver training to their peers in each respective country in the national language. Thus, a broad pool of trained trainers was developed, all of them being able to deliver specialised energy efficiency courses in their respective areas of professional expertise. It had been determined that the training courses needed to be flexible, interesting, visual and practical with clear and comprehensive up-to-date information regarding sustainable construction and, in particular, nZEB. These courses were offered not only to professional trainers from high schools, vocational training centres and universities, but also to all parties involved in the entire construction value chain, including producers and distributors.<sup>15</sup>

However, the main focus of the project was the actual training of construction workers, specialists, and non-specialists with decision-making functions, using the available national and international certification programmes and the newly established practical training facilities (Building Knowledge Hubs, BKHs). The following list shows training topics for each target group:

- Tradespeople: building envelope; building systems; building market, products and technologies; photovoltaic systems; solar thermal; biomass; mini-wind; heating, ventilation and AC; hybrid systems; certified passive house; air tightness; ventilation systems with heat recovery; and insulation systems + thermal bridges
- Specialists: certified passive house design/consulting; nZEB design basics; air tightness; ventilation systems and heat recovery; insulation systems + thermal bridges; RES in nZEB
- Non-specialists: PH/nZEB economics; PH/nZEB basics; PH/nZEB design basics; air tightness; ventilation systems with heat recovery; insulation, PH windows + thermal bridges; RES in nZEB

The project resulted in more than 1,000 trained persons in Bulgaria only; however, it has to be acknowledged that certification for nationally recognised schemes was far from overwhelming. On the contrary, the most successful schemes were the internationally recognised Certified Passive House Tradesperson course and the short courses on individual topics endorsed by informal certification by the project partners EnEffect and the Bulgarian Construction Chamber (also supported by the University of Architecture, Civil Engineering and Geodesy, the Bulgarian Association for Insulation in Construction, product suppliers, etc. on different occasions). Despite the obvious success of the BKHs, availability of qualified trainers and free access to training materials, traditional vocational training providers (professional high schools and vocational training centres), however, did not take up the training offering, most probably due to limited market demand for paid courses.

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<sup>15</sup> Train to nZEB D4.1, 2018

### **Fit-to-nZEB**

The main objective of the programmes offered was to upskill construction professionals in the field of energy efficiency and use of renewable energy systems in deep energy building retrofitting. The assessment of the need for such an intervention in Bulgaria was particularly clear, as just the following relevant learning outcomes were identified as being present in the state educational standards before the start of the project:

- “Technology of Construction”
  - General characteristic of low energy and passive buildings; criteria and principles of the passive building
  - Renovation of existing buildings with elements for low energy construction
- “Building Installations”
  - Energy standard of a building: microclimate in the premises of buildings; heat comfort; humidity; velocity of the air
  - Heating installation: types of heating systems and circuits; elements of the heating installation; types of heat carriers
  - Ventilation installations: classification; ventilation installation schemes
  - Air conditioning installations: basic elements; operations in air conditioning units: filtration, heating, cooling, flushing and humidification of air; air conditioning schemes
  - Renewable energy sources
  - Recuperation system in passive buildings
  - Automation of building installations (BMS)

The project developed units of learning outcomes, exemplary educational plans and programmes for each relevant qualification under the EQF (3-7). The programmes are publicly available, including a full set of materials on 17 distinctive topics. The training aids in form of MS PowerPoint presentations are available in English and each of the partners’ languages (including Bulgarian) to any interested educational institution and/or VET provider, subject of signing a cooperation agreement with the project coordinator EnEffect or the respective project partner. The pilot courses were conducted as follows:

- For EQF 6-7: “Energy-efficient building renovation”, discipline developed by EnEffect and the University of Architecture, Civil Engineering and Geodesy (UACEG)  
The pilot was successful and the discipline continues to be included in the training plans of different graduate programmes of UACEG.
- For EQF 3-5: in the Professional High School of Architecture and Civil Engineering in Pazardzhik  
The school equipped its own Building Knowledge Hub with support of EnEffect and has established itself as a leader in energy efficiency among the 28 specialised high schools in Bulgaria. The programme and the training aids continue to be used in the new discipline “Ecological and energy efficient construction” for the profession “Building Technician”, introduced after a subsequent change in the state educational standards and educational plans.
- For EQF 2-3: The training courses were tested by the Bulgarian Building Knowledge Hub, operated by EnEffect, in many cases in collaboration with UACEG and the Bulgarian Association for Insulation in Construction. The pilot courses also included certification of skills acquired at the workplace. Target groups were high school students and workers, who were acquiring or have already acquired a professional qualification for all specialisations in Professions 582030 “Builder” and 582040 “Builder-Installer”.

The certification provided by the BUS EnerPro, Train-to-nZEB and Fit-to-nZEB projects are generally recognised in the construction sector, and endorsed by the nationally representative branch organisation. Students who complete these trainings at the Bulgarian BKH, involved high schools and vocational training centres have to pass the theoretical and practical examination according to approved programmes. Training methods are classroom training, demonstrations and practical exercises.

It is to be expected that the results from these projects will have a major positive impact on the supply of nZEB-related certification courses and support both the programme developers and the course providers with respect to their sustained training offer.

### **CraftEdu**

During the project CraftEdu, two main programmes were developed for Bulgaria:

- **Windows and Glazing:** Target groups are craftsmen and on-site workers with acquired professional qualification in Profession Builder-Installer, but without previous specialisation in windows and glazing, who are interested in obtaining professional knowledge and skills in window installation relevant in the field of energy efficiency of buildings. The graduate is a qualified professional who is capable of independent work and has the required knowledge and skills in the field of windows installation. He/she has sufficient knowledge and comprehension to read technical documentations and construction details. He/she is responsible for designing workflows for the manufacture, assembly, disassembly and repair of any window constructions. He/she is able to apply acquired knowledge and practical skills in problem-solving, and work independently or in a team. He/she wants to continue his/her education, is constantly interested in the development of building materials and technologies. He/she has advanced knowledge of the types of anchoring and fixing pre-fabricated parts of structures, and is manually skilled in manufacturing building structures.<sup>14</sup>
- **Energy efficiency in buildings – flat roof waterproofing:** Target groups are craftsmen and construction workers, as well as persons interested in acquiring professional knowledge and skills in the field of hydro insulation of flat roofs with regard to principles of energy efficiency and renewable energy systems in buildings. The graduate is knowledgeable and knows how to use intelligent energy solutions. He/she is able to read the building documentation and technical documentation of flat roof water insulation and repairs of flat roof water insulation. Further skills: knowledge of basic technological procedures for water insulation of flat roofs; design of work methods, tools, accessories and materials for assembly and repair of water insulation for flat roofs; assessment of documentation for water insulation for flat roofs; preparation of insulating materials for water insulation for flat roofs; competence in waste management<sup>14</sup>

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### ***Effects on stimulating market demand***

The above-described projects strongly stimulated the supply of nZEB-related qualification and certification services, providing a number of key factors for the development and operation of a streamlined nZEB qualification system. Their implementation led to significant changes in the state educational standards and educational plans, the formation of a pool of adequately trained trainers, development of various training programmes and schemes for certification of new and existing skills, as well as the integration of knowledge from authoritative international sources in the national educational and actual construction practice. A significant number of workers and specialists – more than 2,000 – have undergone training on the newly established schemes. It must be noted that many of the course participants have visited multiple courses, which, while being a solid proof of the quality of the training service, at the same time limits the scope of the outreach and is a signal for a niche market, attractive only for a few specialised companies. The specific topic of nZEB design and construction and deep energy renovation is currently not covered at all – even though somewhat partially – in the national vocational education and training system in Bulgaria and only partially in the higher education establishments. Recently, the newly established discipline for professional high schools of construction and architecture “Ecological and energy efficient construction” has been packed with two new training aids developed by EnEffect. Using input from the CraftEdu and Fit-to-nZEB projects, these were financially supported and endorsed by the Ministry of Education and Science and distributed for use to all high schools, which is definitely a sign of emerging institutional support on the topic.

The demand side, however, remains underdeveloped. This is to a significant extent linked to the failure to impose legal requirements for nZEB design and construction, but is also related to the lowest price-driven real estate market and the low appreciation of the benefits of energy efficiency – very much due to poor examples from unambitious state-financed renovation programmes. Thus, demand for high quality design and construction in the mainstream market is hardly existing (although there are signs of changes in the higher price segment), which directly results in negligence on the part of construction companies and specialists alike, and in low demand for training and certification on energy efficiency. At the same time, the marketing strategy of the Bulgarian BKH, which is strongly connected to the expected introduction of the national nZEB standard available since 2015, has caused significant disappointment among many stakeholders, as despite the requirements of the EPBD, the definition is practically still not in force neither for public nor for private buildings (clearly meaning that Bulgaria is in functional breach of the Directive).

On the other hand, a number of product manufacturers and suppliers have been very active in promoting their innovative products enhancing the energy characteristics of the buildings, in many cases in cooperation with branch organisations, VET providers and the non-governmental sector, including the Bulgarian BKH. This purely market-based endeavour has contributed much more significantly to increasing market demand for high quality construction services than national policies. However, it has its own limitations, such as the lack of coherence with the national educational system and the limited scope. The same applies to existing training and certification schemes under international building standards, which despite their indisputable value and impact, cannot single-handedly deliver a major shift in the construction practice at national level.

### 3.3. France

#### **BIMplement**

Craftspeople and blue-collar workers are not used to cooperate and coordinate with other sectors and companies. Moreover, SMEs and their employees believe that they already have all necessary skills and no need for more trainings. For these reasons, key issues regarding training in France for blue collar workers are air tightness and ventilation. Workers prefer hands-on practice rather than PowerPoint presentations and theory.<sup>16</sup> On base of these findings the following approached have been developed.

#### Pedagogical tools for air tightness and ventilation:

PRAXIBAT is a training tool used for increasing competencies regarding airtightness and ventilation. It is a platform, which includes training materials for hands-on practical work across disciplines. At present, there are several relevant platforms in France, but they are only used by students and apprentices. SMEs do not use them.

Therefore, Formation Intégrée au Travail (training at the workplace) was implemented in the education sector. It offers a mobile PRAXIBAT platform, which can be used at the workplace, and pedagogical mock-ups (including one for air tightness and one for ventilation). The trainings are compulsory and take place during working time, a methodology that has proved successful. The trainings take place in a sea container. A “practicable” cell concentrates the “hot points” of a building, and fits the needs of the various crafts. The target group are blue- and white-collar workers, who are working at the workplace. There are various types of mock-up. The most commonly used are the “house” and the “ventilation tool”.<sup>16</sup>

#### FIT approach:

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<sup>16</sup> BIMplement D3.4; 2020



This training is called FIT (Integrated Training at Work), and it aims at implementing “on-site and hands training” to improve airtightness practice of blue collar workers, by using a special device (designed and developed by Practee Formations). A specific financial support has been brought to the FIT activities through the national PACTE programme. This programme has been developed specifically in the Hauts de France region.

#### BIM approach:

French building companies are a bit late in terms of using BIM, both at the management and design level (within the building company), and even more at the worksite level, where almost no foremen and blue-collar workers open and use BIM models. ASTUS has designed and implemented several types of training sessions directed towards small and medium building companies and craftspeople. Target groups are company managers, project managers, including design offices, on-site foremen, on-site team managers and blue-collar workers. The main objectives are to convince stakeholders of the usefulness of BIM; explain the BIM process and its impacts on everyday work; teach how to use different viewers for quality improvement, for instance ventilation and air tightness.<sup>16</sup>

#### *Effects on stimulating market demand*

Aware of the limits of the different trainings, many institutional stakeholders are getting more involved by systemizing practical trainings especially when it comes to the trades’ transversally, energy performance especially when linked to airtightness.

Some institutional and social landlords are starting to request in their contracting documents that selected companies will have to take onsite trainings.

The FIT training have been widely approved and recommended by operators and landlords, as they allows many benefits in terms of time-saving, faulty workmanship and the achievement of those goals mentioned in the contracting documents.

In France, nZEB regulation (RT2012) impose a blower door test for all new residential building. A maximum result value is imposed in regulation, and its default entails the refusal of building permit. In addition, local strategies and policies in Northern France link grant allocations to the blower door results for renovated residential buildings.

As a consequence, airtightness recently became a real challenge for social landlords who need to renovate hundreds of early 20<sup>th</sup> century dwellings in the region of Hauts-de-France. In this case, market stimulation is based on the fact that acquiring new skills and competencies is an opportunity for companies (who, thanks to this training could apprehend the importance of skilling-up) to obtain new contracts.

### **3.4. Ireland**

The nZEB training courses run by the Waterford and Wexford Education and Training Board (WWETB) that will be rolled out across the country in 2021 are city & gilds assured.<sup>17</sup> This approach was taken as achieving city & gilds assurance was perceived as quicker than getting the training courses recognised by Quality & Qualification Ireland (QQI). QQI is an independent State agency responsible for promoting quality and accountability in education and training services in Ireland. A number of private training providers such as METAC training also provide energy efficiency and renewables training courses at QQI level 6 (e.g. domestic heat pump systems). Finally, many product manufacturers and suppliers run training courses for construction workers, e.g. Ecological Building Solutions, Partel and Saint-Gobain Technical Academy. These courses are not formally recognised.

#### **Skill-Passport**

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<sup>17</sup> These are: NZEB Fundamental Awareness, NZEB Retrofit, NZEB Ventilation, NZEB for Electricians, NZEB for Carpenters, NZEB for Plumbers, NZEB for Plasterers, NZEB for Bricklayers, NZEB for Site Supervisors, and NZEB for Construction Workers.



One of the main challenges in Ireland is the difficulty for end users (homeowners and procurers) to identify construction workers who are upskilled in energy efficiency topics.<sup>18</sup> To overcome this challenge, experts recommend assessing the merits of developing a “Skill-Passport” for built environment activities to facilitate the recognition of skills or competencies. IGBC and LIT, with support from the Sustainable Energy Authority of Ireland (SEAI), worked on the development of recommendations to launch a register of building professionals and construction workers who have upskilled in energy renovation in 2018–2020. The register of energy renovation advisors (building professionals) will be piloted in 2021 as part of the Horizon 2020-funded Turnkey Retrofit project.<sup>19</sup> In the medium term, it is hoped that the Irish version of the BUILD UP Skills app will support/be linked to that register.<sup>20</sup>

### **BUILD UP Skills QualiBuild**

A core recommendation of the BUILD UP Skills Irish Roadmap report is for all construction workers to complete a Foundation Energy Skills (FES) programme. The programme would not only improve their knowledge but also improve awareness of quality building. One of the main criterion for the FES course is that it is delivered nationally and the participants include a wide range of craft workers and general operatives. The course incorporated six learning units and a certified Special Purpose Award at NFQ 6:

- Energy and buildings
- How energy works
- Building fabric 1
- Building fabric 2
- Heating and Ventilation
- Systems thinking

The FES programme was successful in a pilot training for 200 workers and has been slightly updated into an nZEB programme by LIT and adopted by the ETBs (education and training board) in Ireland for construction workers and recognised by SOLAS as a crucial piece of training. Further nZEB trainings have now been developed for each of the trades (electrical, plumbing, carpentry, bricklaying and plastering, with additional programmes for site supervisors and ventilation), and are currently being implemented to run alongside the apprenticeships and to upskill the existing trades in industry. It should be noted that the course retains the collaborative and systems thinking approach in its delivery.

To ensure that the nZEB courses are quality assured, QualiBuild also developed a Train the Trainer programme to upskill 100 trainers of construction skills. The programme was developed and certified as a four-module Special Purpose Award at NFQ Level 7 (20 ECTS Credits) – “Certificate in Training in Low Energy Buildings”. The activities were hosted on LIT Moodle. The four modules include: Building for Energy Performance, Building Fabric, Building Services and Pedagogical Approaches.<sup>21</sup>

This course has also been adapted by LIT and adopted by ETB currently being implemented with ETB trainers nationally with a blended delivery format.

### **Fit-to-nZEB**

Ireland participates in the project Fit-to-nZEB, like Bulgaria (see Chapter 3.2). The findings and development of the **Train-to-nZEB project**, in which Ireland acted as peers for the trainings and development of the training centres, set out further programmes. The main objective of the programmes offered is to upskill construction professionals in the field of energy efficiency and use of renewable energy systems in buildings. In Ireland, the same courses as in Bulgaria are implemented:

<sup>18</sup> <https://enterprise.gov.ie/en/Publications/Publication-files/Building-Future-Skills.pdf>

<sup>19</sup> <https://www.turnkey-retrofit.eu/>

<sup>20</sup> <https://www.igbc.ie/education/energy-renovation-upskilling/>

<sup>21</sup> BUILD UP Skills QualiBuild Final Report

- “Technology of Construction”
- “Building Installations”

### **MeNS Project**

The MeNS project enabled the elaborated programme to be developed further in Ireland and is now recognised as one of the leading courses in nZEB detailing for professionals.

The programme “DIT’s MSc in Building Performance – Energy Efficiency in Design” has been designed to enable professionally qualified architects, architectural technologists, engineers and building surveyors to develop skills in energy efficiency design for new and renovation building projects. The contents are: nZEB Policy & Technologies; nZEB Calculation & Cost Optimality; Energy Modelling Tools (DEAP, PHPP and Dynamic Simulation / NEAP); Hydrothermal Risk Assessment for Building Performance; Thermal Bridge Calculation for Building Performance; Building Environmental Assessment Methods; Building Performance nZEB Design Project: Multi-Unit Residential & Office; and Building Performance Research Project. The programme can be completed over a longer period as a series of modules that combine to form a Postgraduate Certificate, a Postgraduate Diploma and ultimately an MSc.<sup>22</sup>

**BIMzeED – Education for zero energy buildings using Building information Modelling**

The main aim of this project is to update the knowledge and skills of educators and trainers and SMEs in the field of BIM and nZEB through provision of specific new innovation educational materials and stimulate development of new training and education programmes/modules in the fields of BIM/nZEB.

BIMzeED is developing and piloting twelve learning units for the entire construction industry with EQF of 4 to 7 levels. The learning units can stand alone, be grouped together or integrated into existing curricular. 120 trainers/educators will be trained and they will then train 500 construction students, professionals, site managers, craft workers and operatives.

### **Cross-sector training programmes**

The following courses are not all implemented in Ireland, but were at least developed. Collaboration between construction professionals is key to develop mutual understanding of each other’s disciplines and combine skills to achieve optimal retrofitting. Several multi-disciplinary training programmes have subsequently been developed to encourage a higher level of cooperation between professionals in retrofitting projects.<sup>22</sup>

- **Green Building Professional – Training and Certification Programme:**

This training is aimed at professionals working on sustainable construction projects. The programme is intended to ensure cross-training between different disciplines. Mandatory courses: Legal Requirements and Voluntary Certification for Green Buildings; Green Design Principles; Financial Considerations of Green Buildings; Managing Green Building Projects; Sustainable Site Selection & Management; Lighting Design & Smart Buildings; Sustainable Materials & Resources; and Building Envelopes of Green Buildings.<sup>22</sup>

- **Domestic Retrofit Coordination and Risk Management:**

The Domestic Retrofit Coordination and Risk Management training course was developed to upskill construction professionals to become approved retrofit coordinators able to lead, manage and quality assure retrofit projects. There is also a further education course for everyone who is already familiar with the basics. All courses are fully CPD accredited by the Royal Institute of British Architects and lead to a diploma. The training course contained the following topics: Introduction to Domestic Retrofit; Assessing Dwellings for Retrofit; The Business Case for Retrofit: Costing, Evaluation and Funding; Building Services Retrofit; Ventilation and Air tightness

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<sup>22</sup> ECCoPro Report: Towards Large Scale Deep Renovation – Unlocking Ireland’s Potential; 2017

for Retrofit; Building Fabric Retrofit and Fundamentals of Solid Wall Insulation; Retrofit Coordination and Risk Management and Retrofit Building Physics.<sup>22</sup>

- Technological University Dublin's MSc in Building Performance – Energy Efficiency in Design:

The programme has been designed to enable professionally qualified architects, architectural technologists, engineers and building surveyors to develop skills in energy efficiency design for new and renovation building projects. The training course contained the following topics: NZEB Policy & Technologies; NZEB Calculation & Cost Optimality; Energy Modelling Tools (DEAP, PHPP and Dynamic Simulation/NEAP); Hydrothermal Risk Assessment for Building Performance; Thermal Bridge Calculation for Building Performance; Building Environmental Assessment Methods; Building Performance NZEB Design Project: Multi-Unit Residential & Office; Building Performance Research Project.

The programme can be completed over a longer period as a series of modules, which combine to form a Postgraduate Certificate, a Postgraduate Diploma and ultimately an MSc.<sup>22</sup>

- Fundamentals of Energy Renovation for Traditional Buildings – CPD Lecture Series:

The lecture series was developed by the Heritage Council and Carrig Conservation with support from the Sustainable Energy Authority of Ireland to support energy renovation of traditionally built buildings. CPD credits were provided by the Royal Institute of the Architects of Ireland (RIAI) and Engineers Ireland. The lecture series was also endorsed by the Society of Chartered Surveyors (SCSI). Duration: 5 full days of lectures.

- Waterford Institute of Technology – Certificate in nZEB Design (Postgraduate):

This course aims to provide expertise in the design of dwellings and buildings other than dwellings to comply with the nZEB standards. It aims to provide the professional with the knowledge and skills to quantify energy flow paths in buildings, and to make engineered decisions as to energy reduction, thermal and electrical and energy supply measures. Duration: 1 year – part-time blended learning.

- Limerick Institute of Technology – Near Zero Energy Buildings (Special Purpose Award Certificate):

Participants develop an outline design for a new or retrofitted building with the aim of achieving a nearly zero energy building. The programme has been developed to be online with a total of two weekend sessions for site visits and design tutorial. Duration: 30 weeks (online).

- WWETB – NZEB Fundamentals Course:

The course aims to provide learners with the knowledge in the general principles and practices of nZEB. Duration: 1 day. Format: Classroom.

### **Sector-specific training programmes**

The following courses are not all implemented in Ireland but were at least developed. While all construction professionals involved in a retrofit project require a common body of knowledge, some profession-specific skills are needed.<sup>22</sup>

- Built Environment Professionals – Energy Assessor Training:

There is a range of courses for building services engineers wanting to become energy performance specialists. The training course contained the following topics: Energy Performance of Buildings Directive, building regulations Part L, energy efficiency in buildings, energy performance certification, calculating carbon performance and compliance.<sup>22</sup>

- RIAI – NZEB and TGD Part L Conservation of Fuel and Energy – Dwellings:

This CPD sees the Department of Housing, SEAI and industry experts describe the impact this new legislation will have on current and future projects and how architects should advise clients.

The aim of the course is to provide architects with an update on the context for nZEB including European and Irish policy and legislation, the impacts of TGD Part L and how to advise clients.

- RIAI – NZEB and TGD Part L Conservation of Fuel and Energy – Buildings other than Dwellings:  
This CPD sees the Department of Housing, SEAI and industry experts describe the impact this new legislation will have on current and future projects and how architects should advise clients. The aim of the course is to provide architects with an update on the context for nZEB including European and Irish policy and legislation, the impacts of TGD Part L and how to advise clients.
- End users – Training for Rebuilding Europe:  
Capacity building of public and private property owners is crucial to inform and empower them to take the right investment decisions and confidently engage in business relations with professionals. Training materials were developed for both associations of property owners and local authorities as part of this project.<sup>22</sup>
- Valuation Professionals – Renovalue: Integrating Sustainability into Valuation Practice:  
A free training course on how to identify and apply energy efficiency and renewable energy factors into a valuation.<sup>22</sup>
- Heat Pump installers:  
This blended training course is aimed primarily at potential installers of packaged heat pump systems for the domestic and small commercial sector. It delivers the fundamental principles for the understanding, specification and installation processes of heat pump systems for the heating and cooling of buildings.

#### *Effects on stimulating market demand*

Since the Horizon 2020 Build Upon project, key stakeholders have constantly repeated the importance of skills recognition to drive demand for upskilling.<sup>23</sup> The key idea being that if end users (homeowners but also procurers) were asking for construction workers who had upskilled in energy renovation, this would drive demand for upskilling. This in turn would improve quality, which would support Ireland's renovation targets.

In 2018–2020, IGBC and LIT, with support from SEAI, worked on the development of recommendations to launch a Renovation Register, allowing end users to identify construction workers and building professionals who have upskilled in the area. Based on the RIAI's conservation architects and PAS 2035 in the UK experiences, it seems that public procurement, planning and legislation have a critical role to play in driving upskilling.

The "Building Future Skills – The Demand for Skills in Ireland's Built Environment Sector to 2030" report published in 2020 by the Expert Group on Future Skills Needs and the National Skills Council also recommend assessing the merits of developing a Skill-Passport for built environment activities to facilitate the recognition of skills or competencies.<sup>9</sup>

### **3.5. Netherlands**

Besides already mentioned existing recognitions and certifications in Section 2.5, a number of training schemes are currently under development, such as 'Connecting to heat networks and optimising these connections', 'Fuse box optimisation to enable electrification', 'Hydraulic balancing', 'DC networks' and 'Infrared heating systems'.

Moreover, it has to be mentioned that several previously mentioned construction skills projects also added elements to the following approaches.

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<sup>23</sup> See [Towards Large Scale Deep Energy Renovation – Unlocking Ireland's Potential](#) (2017) and [Co-Designing an Ambitious National Renovation Strategy](#) (2020)

## **PROF/TRAC**

PROF/TRAC provides job descriptions and nZEB qualifications for all of Europe. This developed framework forms a basis for comparing the required nZEB skills for professions between countries. In addition, PROF/TRAC has developed a proposal for a qualification system. This defines the qualifications, the professions involved and the minimum qualification levels for nZEB skills for professionals with a university degree. This qualification is applied in the Netherlands in a multidisciplinary design training for architects, engineers and project leaders. The PROF/TRAC training repository is added to the BUILD UP Skills Advisor app and enriched with new e-learning modules entering the market for upskilling professional, especially several MOOCs (Massive Open Online Course) provided by universities worldwide.<sup>24</sup>

## **BIMplement**

The BIMplement Qualification Framework is used quite intensively in the Netherlands, especially to develop and share new qualifications. This framework consists of a flexible methodology that allows the definition of professional activities, related skills, and required competencies in order to achieve the desired quality in the field of nZEB. It is composed of tasks and related subtasks that have to be performed at a certain time in a process and by (a) certain person(s) with a certain skillset. The BIMplement Qualification Framework is a multi-layered qualification, which consists of a layer with basic tasks and one or more context-specific layers.

Not all workers have the same understanding of BIM and nZEB. For basic knowledge, there are a few learning methods<sup>16</sup>:

1. Get a basic understanding of BIM: To help workers to get a basic understanding of BIM, there are several tools: BIM awareness training, book “Starting with a BIM”, instruction videos.
2. Obtain an insight into current BIM qualifications: It is quite common for workers to have certain qualifications in relation to BIM without knowing it. The tools for obtaining insights are: BIM maturity test, BIM competency test.
3. Get a basic understanding of nZEB: To help workers to get basic knowledge of nZEB, there are the following tools: e-learning modules on air tightness and ventilation in the BUILD UP Skills Advisor app.
4. Obtain an insight into current nZEB qualifications: Similarly to getting an idea of current BIM qualifications, workers can gain an insight into their current nZEB qualifications. The tools for obtaining nZEB-related insights are: learning from building errors with the BUILD UP Skills Advisor app.

Moreover, there are many learning methods that support practicing and improving skills<sup>16</sup>:

1. Obtain an insight in project-specific qualifications (BIM and non-BIM): Project-specific qualifications can be derived from (inter)national or company-specific frameworks. The following tools can help: Syllabus, BIM Trivia (game), BUS Advisor app (BUILD UP Skills).
2. Acquire missing competencies (BIM- and nZEB-related): If there is a gap between current and required competencies, workers need to acquire the missing skills. There are a few tools to help them: training, e-Learning, and virtual reality.
3. Practice complex situations a/o improve skills: The following tools can help: virtual reality, simulations, mock-ups.
4. Consult colleagues

In order to assess the need for upskilling, the BIMplement maturity scan is applied. This enables BIM implementation coaches and training institutes to spot skill gaps and skills inequality.

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<sup>24</sup> PROF/TRAC D3.2; 2017


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Fig 3: BIMplement maturity scan

## BUSToB

During the BUSToB project, a huge number of e-learning have been developed to address fundamental or basic knowledge gaps with regard to technical specialisms and cooperation on-site. Furthermore, experience is built up with the development of micro-learning in order to learn of mistakes made in the field. This makes it possible to offer workers in the building and installation sector foundation courses on sustainable technologies and additional skills. The project also worked on closing the qualification gap between the current craftsman and the skilled craftsman of 2020. Each craftsman should acquire an occupation-specific skillset of relevant technical and soft skills. This should give craftspeople at least basic knowledge of technologies that play a role in energy efficiency.<sup>25</sup>

## Skill-Passport

As a possible solution for addressing the latter challenges, involved branch organisations (Techniek Nederland and Bouwend Nederland) are working on a digital Skill-Passport and a digital register of craftsmanship. In the digital Skill-Passport, mechanisms will be provided to recognise prior learning and informal learning on the job. In the digital register, the more formal recognitions will be stored. For providers of e-learning and micro-learning such as the BUILD UP Skills Advisor app, it will become possible to add on-the-job and micro-learning steps to the digital Skill-Passport. Also, explorations on the application of task-based qualifications (as applied in BUSLeague) are under way in order to provide flexible add-ons to existing schemes, reflect innovations and improve methods.

## Effects on stimulating market demand

In the Netherlands, the following already known effects of recognition on stimulating market demand are identified:

<sup>25</sup> BUSToB: <https://buildupskillsnederland.nl/english/>; 17.11.2020

- In the Netherlands, regional government found out that at the time when there was recognition in the heating pump sector, nearly all regions wanted to have a training centre for that. This led to a huge boost in the number of heating pump specialists trained on a yearly basis in the Netherlands from 60 to 600.
- Recognition was valuable in tackling urgent issues regarding PV fires (of in-roof systems) with insurance companies. The existing voluntary scheme for solar PV is extended to include competencies for quality assurance and inspection.
- For ventilation technology, a track is currently under development with the active involvement of manufacturers and suppliers. This is linked to quality assurance of ventilation systems in nZEB and energetic renovations.
- Several regular education providers have incorporated materials from BUStoB and BUS\_N@W into their VET education.
- A daily growth in the number of BUILD UP Skills Advisor app users
- Growth in new trainings in the field of energy transition; new trainings are created every month

### 3.6. Spain

The ‘Construction Card’ has been established since 2012 as a recognition mechanism for the training of Spanish blue-collar workers. The card records the working life of each holder as well as completed trainings, provided that these trainings are recognised by the entity that issues the card, the Construction Labour Foundation. The card must be renewed every five years.

#### **Construye2020+**

The Construye 2020+ partnership is working on the development of a Green Tag that will be included in the Professional Construction Card (TPC) to recognise skills of workers trained in energy efficiency, renewable energy systems and in nearly zero-energy building (nZEB). The free training from Construye 2020+ offers added value: once the student passes the course, he or she obtains a “Green Tag”, which appears on the Construction Professional Card (TPC) and recognises the effort and interest of its holder in training and work for more efficient and comfortable construction, refurbishment or rehabilitation of housing. This system will benefit workers, SMEs and entrepreneurs in the construction industry, end users or customers.

#### **PROF/TRAC**

The European PROF/TRAC Qualification Scheme is intended to help overcome market barriers to a successful design and construction process of nZEB. PROF/TRAC provides job descriptions and nZEB qualifications for all of Europe.<sup>26</sup> The Netherlands was also part of this project.

#### **BIMplement**

The BIMplement Qualification Framework consists of a flexible methodology that allows the definition of professional activities, related skills, and required competencies in order to achieve the desired quality in the field of nZEB. The Netherlands was also involved in this project.

#### *Effects on stimulating market demand*

The creation of a recognition system that allows the incorporation of shorter-term training in a more agile way (professional construction card) as a complement to the national qualification system was a first step towards advancing the increase in training demand. However, since construction companies

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<sup>26</sup> PROF/TRAC D3.2; 2017

today are not required to have staff with any specific training or qualification other than short safety courses, the demand for specialised training has not taken off.

However, there is an increased demand for training due to the requirement for companies to have qualified staff when participating in tenders, as well as the growing number of customers looking to improve energy efficiency in their homes and implement energy communities.

### **3.7. Summary of effects on stimulating market demand**

In Austria, the market was stimulated by the short on-site training (Basic CrossCraft module) of the project BUILD UP Skills CrossCraft. The training module was convincing due to its usability and the enforcement of cross-craft understanding between the craftspeople. Moreover, building owners became aware of the benefits of blower door tests and were more interested in them. Because the approaches of the project NEWCOM were not completed until the end of 2020, the results have not had the time to stimulate the market so far.

In Bulgaria, demand for high quality design and construction in the mainstream market is hardly existing (although there are signs of changes in the higher price segment), which directly results in negligence on the part of construction companies and specialists alike, and in low demand for training and certification on energy efficiency. On the other hand, a number of product manufacturers and suppliers have been very active in promoting their innovative products enhancing the energy characteristics of the buildings, in many cases in cooperation with branch organisations, VET providers and the non-governmental sector.

In Ireland, laws promote further education in the field of energy efficiency. This can also increase the market demand for recognised competencies in this area. Moreover, when there is an official recognition of skills, the demand for courses providing such skills are increasing.

In the Netherlands, courses that ensure safety in addition to energy efficiency also have the effect that insurance companies often require trained craftspeople according to these standards. Therefore, the demand for these courses increased. Moreover, generating a recognition system that allows the incorporation of shorter-term training in a more agile way, as a complement to the national qualification system, was a first step towards advancing the increase in training demand.

In Spain, the generated recognition system that allows the incorporation of shorter-term training in a more agile way (professional construction card), as a complement to the national qualifications system, has been a first step towards advancing in the increase on the demand for training.

In France, market stimulation is based on the fact that acquiring new skills and competencies is an opportunity for companies (who, thanks to this training could apprehend the importance of skilling-up) to obtain new contracts.



## 4. Lessons learned and outlook

The national approaches to stimulate the demand of energy efficiency skills described in Chapter 4 are intended to optimise the recognition and expansion of further education in the field of energy efficiency. In the BUSLeague project, the partner countries focus on micro-learning and e-learning in order to be able to offer the craftspeople training opportunities without spending a lot of time. In addition, training offer in training centres and hardware stores shall be expanded. Moreover, the BUILD UP Skills Advisor app including the Skill-Passport, which is already in use, should be further expanded in this project.

To tackle the challenge of mutual recognition of qualifications, the taught competencies shall be described according to a consistent methodology.

### 4.1. Austria

Based on the problems, challenges and effects of national approaches to stimulate market demand for energy efficiency, Austria will take the next step with the BUSLeague project.

In the first step, the national climate protection network (klimaaktiv) will be actively used to identify actually needed energy skills and possibilities to support the recognition of correspondent trainings. A specific national focus will be the cooperation with national supplier networks to determine presently successful supplier trainings.

In the next step, activities will be implemented to stimulate market demand for energy skills. Based on the national experiences with the topic of upskilling building professionals, it can be assumed that micro-learning will be an optimal possibility to transfer needed training content to building professionals due to the fact that craftspeople often have only little timeslots for upskilling courses. Accordingly, the use and implementation of digital means for the recognition of skills and upskilling will be a national focus. Therefore, one of the goals of BUSLeague is the exploration of the BUILD UP Skills Advisor app (further development of the NEWCOM competence database).

After relevant content for micro-learning has been identified, cooperation with practical training centres and suppliers is planned to find an optimal way to implement and upscale these micro-learning trainings.

Another important milestone will be to enable the recognition of the training content (energy skills). To tackle this challenge, on the one hand, gained competencies will have to be described according to a methodology that allows compiling qualifications with the other partner countries. On the other hand, the provided content of energy skills have to be recognised by the Austrian market. To support this process, different ways of stimulating the demand for energy skills will be tested (e.g. inclusion of an energy efficient training or checking clause in public tenders).

### 4.2. Bulgaria

Experience from previous activities and international cooperation projects implemented in the past decade clearly demonstrates the need to exercise simultaneous impact on all elements of the system in order to influence the demand for nZEB-related VET services. This is a very challenging task given the complexity and fragmentation of both the construction and the VET sectors. However, it is believed that a streamlined approach focused on stimulating the demand-side through proactive communication campaigns and diversifying and enhancing the existing training offer would exercise a tangible impact on the perceived value of the energy efficiency skills and knowledge across the construction sector. This is particularly true if coupled with dedicated national policies and financial instruments in this area, which is clearly expected in light of the ambitious EU policies regarding the Green Deal and the Renovation Wave.

With the goal of capitalising on possible synergies with the overall EU policies (and despite obvious limitations triggered by the COVID-19 pandemic), the BUSLeague project in Bulgaria will apply a coherent strategy based on policy advocacy, direct engagement of both professional and end-user audiences, and further development of the VET supply and improvement of the training services. More specifically, this will take (and is already taking) shape in a broad public campaign for improved skills requirements of national financial support programmes for deep energy retrofitting, support for on-site training at public renovation/new nZEB projects, push for promoting qualification requirements in public procurement procedures, and organisation of large-scale events (construction fairs with a focus on energy efficiency), including policy workshops, commercial exhibitions, live demonstrations, media events, combined with off-site and on-site training activities.

On the other hand, activities to develop the supply of tailored energy skills training and certification services will include the establishment of an online modular training platform, creating capacities for blending of distance learning approaches with on-site training and demonstrations (including through the use of mobile practical training equipment). They will also be integrated into existing capacities and facilities developed under the BUS EnerPro, Train-to-nZEB and Fit-to-nZEB projects, targeting in the long term the establishment of energy retrofitting consultation centres (with the potential to develop as one-stop shops) in different cities of the country.

### 4.3. France

The French implementation plan includes the following actions to solve the identified problems and challenges with the recognition of energy skills:

#### 1. Information and awareness campaigns

This is going to be done for three main target groups: Housing's owners, Decision makers and "influencers" and Craftsmen and SMEs. The objective is to stimulate the demand for deep renovations, and for energy skills. These campaigns will be implemented through the following channels:

- DIY stores (a partnership with Leroy Merlin to be developed), possibly using the mock-ups developed by Practree.
- Suppliers, such as Saint Gobain, which has agreed to participate in BUSLeague.
- Local authorities, with the *Support de Dialogue Prospectif* (SDP) methodology tested in the Cambrésis area.

#### 2. Improvement of the EE-skills:

The objective is to build and test blended EE-skills trainings including the "on site trainings" (on its French acronym+ BIMplement) and micro e-learnings. One of the challenges is to make the use of these trainings at small workplaces possible. New tools will be developed for that purpose.

- The recognition of these EE- skills will be based on the RGE label, continually seeking to improve it.
- The promotion and the implementation of the EE skills trainings will be done within the national network of the "FEEBAT certified trainers".
- Among the stakeholders of this action, it is expected to include Constructys, the EDF, which finance EE-skills trainings, and the French Agency for the quality of constructions (AQC).
- The "training clause", implemented in the Hauts de France for the past two years, will be used to promote these trainings.

#### 3. Improvement of the sourcing of qualified workers:

The objective is to increase the flow of qualified workers in the building sector. This will be done with the implementation of *Bâtis Ton Projet* (BTP), a methodology and tool developed by Practree.

#### 4. Development and implementation of local strategies:

The objective is to make the actions part of comprehensive local strategies shared by all the local stakeholders of deep renovation and upskilling. For achieving this, the SDP methodology and tool developed by Alliance Ville Emploi and ADEME, and successfully tested in the Cambrésis area, will be implemented in new territories.

The implementation of the French plan will be done with the help of stakeholders which have agreed to participate in BUSLeague. Four working groups will be set up in April 2021, with the following topics: Financing deep renovation, Upskilling, Implementing the training clause and Local strategies.

#### 4.4. Ireland

As part of the Horizon 2020-funded Turnkey Retrofit project, a version of an energy renovation register will be piloted in early 2021. The purpose of register is to encourage and facilitate building professionals and construction workers upskilling in energy renovation and to make it easier for all users to identify those who have upskilled in energy renovation. This will allow homeowners using the platform to identify building professionals who have upskilled in energy renovation.

As part of BUSLeague, IGBC and LIT will also facilitate upskilling. For that, the implementation of nZEB training programmes for craft workers, site supervisors and public authority staff at training centres will be continued and will be developed to permit mutual recognition across Europe. Also, there will be a strategy for further upskilling on-site practical/demo/AVR trainings using short add-on training tools and modules to existing programmes making possible training for all types of work places implemented. This will be developed in close cooperation with training providers, VET and third level institutions and under existing EU projects such as BIMzeED, Train-to-nZEB and All.Con Blueprint. These trainings will be made available through the Irish BUSApp. This will be further supported by the work to be completed by IGBC and LIT, in partnership with Athlone IT, Galway-Mayo IT, VVWETB and Tipperary Energy Agency as part of the Digital Academy for Sustainable Built Environment Project funded by the Higher Education Authority of Ireland. This work involved developing a hub for provision of education in the construction sector focusing on green building, circular economy and digital skills. It will enable rapid design, development and deployment of training programmes for construction workers using a wide variety of online, blended and face-to-face approaches.

Moreover, IGBC and LIT will develop strategies to stimulate demands for energy skills. For that, the skills register (post Turnkey Retrofit pilot) and the BUSApp will be further developed to enable workers in Ireland to profile their skills, hence encouraging upskilling. The “energy efficiency/nZEB” register will be promoted to end users, from homeowners to large public and private procurers, so that they ask for qualified building professionals, craftsperson and construction workers, hence driving demand for upskilling. Furthermore, there should be secure commitments from at least three public bodies and three private organisations to use the “energy efficiency/nZEB” training clause as part of their procurement process. Also, the Home Performance Index certification and Green Mortgages (Smarter Finance for families) will be developed as a lever to stimulate demand for energy efficiency projects using skilled workers. In the future, it should be worked together with hardware retailers on awareness of skills needs for retrofit and nZEB.

#### 4.5. Netherlands

In the Netherlands, the focus of BUSLeague will be on putting the results of previous projects into operation and on working with national stakeholders and initiatives. The BUSLeague qualification and recognition of EE skills will be introduced as a fundamental primer for all actors in the value chain with regard to sustaining the built environment. In order to achieve this, BUSLeague-NL will specifically focus on:

1. Implementation of the task-based EE qualification, including upskilling of housing associations and municipalities with regard to the value of EE skills (to convince them to add EE skill requirements to procurement procedures and guidelines on quality assurance)

2. Cooperation with national stakeholders and branch organisations in order to use the EE qualification to achieve EE recognition; in a value chain-oriented approach
3. Further use and elaboration of micro-learnings and short e-learning both inside and outside the BUILD UP Skills Advisor app; with a focus on using them on construction sites and in hardware stores

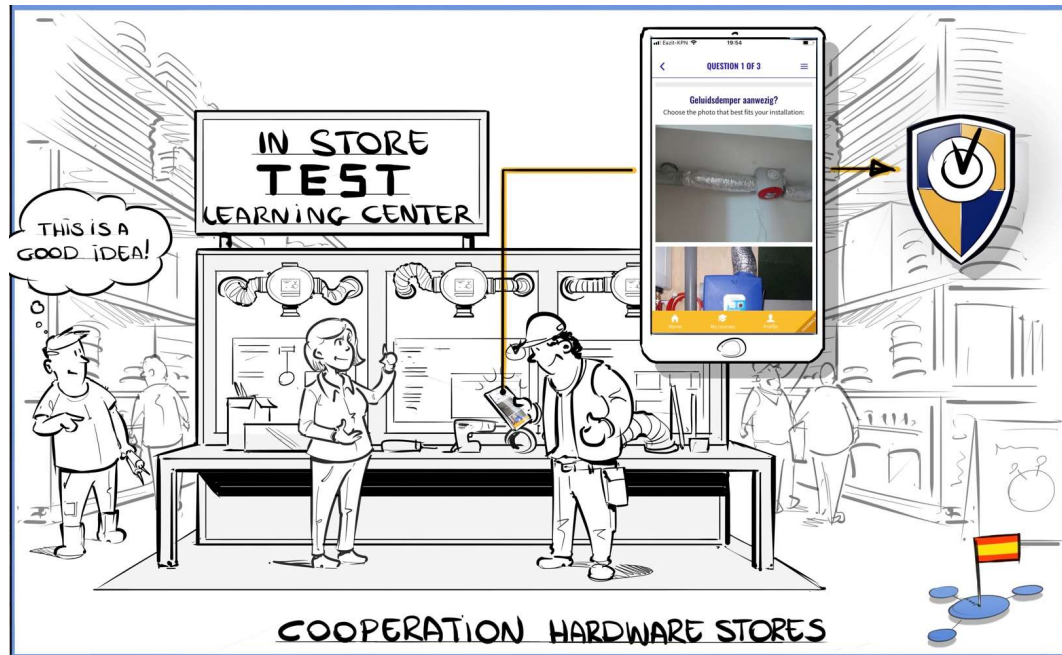


Fig 4: Use of Advisor app

4. Feeding of new results and experiences from BUSLeague into the network of training institutes and regular education providers; including working with them to make the BUILD UP Skills app more popular
5. Investigation of how BUSLeague can connect to the National Skill-Passport and the Central Register for craftsmanship
6. Exploration of how to connect BUSLeague to plans for sustaining the built environment that have to be delivered in the coming years; with a focus on the Natural Gas-Free Neighbourhoods Programme

#### 4.6. Spain

In Spain and within the framework of the BUSLeague project, the actions are mainly aimed at raising awareness (in collaboration with Bauhaus) and promoting the training and recognition of EE skills of professionals that must be carried out by the regional government:

1. Promotion of skills recognition systems:

IVE will support the regional government in the creation of a skills recognition system. These skills (both in energy efficiency and other topics) will need to be acquired by professionals either through training or through accredited professional experience.

The regional government already has confidential databases where professionals and their qualifications are listed. BUSLeague, through IVE, will support the regional government in making this information public and accessible to citizens.

The long-term goal is to create a Skill-Passport. This passport or card will be linked to the official website of the regional government via a QR code or similar code (electronic verification code) to provide transparency and credibility to the system.

2. Advancing of the EE qualification framework:

The Spanish Ministry of Education has a very exhaustive and rigid qualification framework (QF). IVE will carry out a comparison between the BUSLeague EE qualification framework and the current QF in Spain. If a gap is detected, the first steps will be taken to recommend the inclusion of new EE skills in the future.

3. Promotion of micro-training:

The official training of the Ministry of Spain is of very long duration, since it groups the skills in very extensive modules. For this reason, a working group will be proposed in which technicians from the regional government and IVE will participate, together with other key agents dedicated to training, to establish a roadmap towards micro-training and micro-accreditation. The conclusions may be transferred to the national level.

4. Implementation of awareness campaigns:

Lack of awareness is one of the main barriers to the penetration of the energy efficiency market in Spain. Therefore, various information and awareness campaigns will be carried out within the framework of the project. Bauhaus is planning to carry out several actions in its Valencia store, and many of these actions will be replicated in the eleven stores in Spain, reaching a very wide audience. These actions will include playful and festive elements so that the success of participation is assured: the "women's night", "learn and do it" workshops, the "children's club" on the weekend, etc. These are regular Bauhaus events, which this year will be dedicated to energy efficiency and the goals of BUSLeague. These actions will be complemented by Bauhaus online channels. IVE also has the support of user and consumer associations, as well as associations of building owners and managers, so that the flow of information to citizens is guaranteed.





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