BUILD UP Skills – EU overview report

Staff working document

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Further information

More details on BUILD UP Skills can be found at www.buildupskills.eu

More details on the IEE programme can be found at http://ec.europa.eu/intelligentenergy
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Introduction

The European Union faces serious and unprecedented energy challenges relating to sustainability and greenhouse gas emissions as well as energy security. In March 2007 the European Council agreed to an energy policy that establishes a political agenda designed to achieve the EU energy objectives of sustainability, competitiveness and security of supply. Accordingly, the EU has committed itself to the "20-20-20" initiative: reducing greenhouse gas emissions by 20%, increasing the share of renewables in energy consumption to 20%, and improving energy efficiency by 20%, all by 2020.

In this context, the building sector has a particular role to play as it represents about 40% of energy use in the EU with the largest cost effective savings potential. The EU has adopted an ambitious vision for the energy performance of its buildings. By 2020 all new buildings shall be nearly zero energy buildings\(^1\), with intermediate targets by 2015. In parallel, Member States shall draw up national action plans for increasing the numbers of nearly zero-energy buildings. These national action plans shall include policies and measures to stimulate the transformation of existing buildings, which are refurbished, into nearly zero-energy buildings. In addition, by 2015 all new buildings and buildings undergoing major renovation\(^2\) must prove that a minimum level of energy comes from renewable sources. Therefore, a major transformation must occur in the building sector during the next few years.

This transformation and the transition to a low carbon economy is a major challenge to the construction industry. To meet these objectives, many studies\(^3\) have highlighted that major efforts are needed to improve the skills of building workers.

Since 2003, the Intelligent Energy-Europe (IEE) Programme has been one of the EU’s instruments to tackle such non-technological barriers to the spread of efficient use of energy and greater use of new and renewable energy sources. One of the main objectives of the IEE programme is to promote institutional capacity building. This includes encouraging exchanges of experience and know-how among the main players concerned, business and citizens in general and stimulating the spread of best practices and best available technologies, notably by means of their promotion at EU level. From 2007, IEE has been included in the overall Competitiveness and Innovation Framework Programme (CIP)\(^4\) in order to contribute to achieving the objectives of EU energy policy and to implementing the Lisbon Agenda.

The Programme is managed by the Executive Agency for Competitiveness and Innovation (EACI, formerly known as Intelligent Energy Executive Agency) under powers delegated by the European Commission.

The IEE programme has therefore funded a wide-range of capacity building activities for the building workforce. For instance, for renewable energy installers, PVTRIN (01/05/2010 – 30/04/2013) aimed to train and certify photovoltaic installers in six European countries. QualiCert (01/07/2009 - 31/12/2011) encouraged a common quality certification and accreditation system for installers of small-scale renewable energy systems. Regarding the

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1 ‘Nearly zero-energy building’ is a building which has very high energy-efficiency performance, determined in accordance with Annex I to the EPBD (recast). The nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including renewable energy produced on-site or nearby (see Article 2: ‘Definitions’).
2 ‘Major renovation’ means renovation of a building where (a) the total cost of the renovation relating to the building envelope or the technical building systems is higher than 25 % of the value of the building, excluding the value of the land upon which it is situated, or (b) more than 25 % of the surface of the building undergoes renovation.
training of craftsmen, TRAINENERGY (01/10/2009-30/09/2011) trained 500 building craftsmen to offer intelligent energy solutions in the construction sector in 6 countries.

In this context, BUILD UP Skills is a strategic EU initiative currently carried out under the framework of the Intelligent Energy Europe (IEE) programme to unite forces and to increase the number of qualified workers in the building workforce in Europe.

BUILD UP Skills focuses on the continuing education and training of craftsmen and other on-site workers in the field of energy efficiency and renewable energy in buildings and has 3 components:

- **Establishment of national qualification platforms and qualification roadmaps to 2020 (Pillar I – 2011-2013).** The aim was to trigger processes to gather all relevant stakeholders in a country to develop and agree on a strategy and roadmap, after identifying and quantifying needs and priority measures. The first phase of all projects was to complete an analysis of the state of play compiled in a national status quo report. The national reports include information on current characteristics of the building workforce, skill needs and gaps, barriers to training, existing strategies and policies. 30 countries have been supported including the 28 EU Member States as well as Norway and the Former Yugoslav Republic of Macedonia.

- **Development and upgrade of qualification and training schemes (Pillar II – from 2013).** This component invites proposals for introducing new or upgrading existing qualification schemes. These should be based on the BUILD UP Skills national roadmaps developed under Pillar I. 10 country projects have already started and more will follow soon.

- **Europe-wide coordinated support activities.** The objective is to support the exchange of best practice through meetings of all participating BUILD UP Skills projects.

This report provides an overview of the national status quo reports produced in the first phase of the BUILD UP Skills initiative, between November 2011 and April 2013. It provides information on the building workforce and the building sector with highlights from the 30 countries covered. It analyses the existing vocational education and training provisions and the training needs and gaps. It also lists the most frequent barriers to the up-skilling of building workers in Europe.
1. Methodology

All BUILD UP Skills Pillar I projects are structured according to a similar work programme with the following features:

- the set-up of a national stakeholder platform open to all relevant and interested parties from the energy, construction and vocational training sectors.
- the completion of a national status quo report within the first 6 months of the project based on a common template and outline
- the completion of a national roadmap to 2020 for the training of building workers based on a suggested outline
- endorsement activities to ensure the buy-in of relevant stakeholders and public authorities
- EU exchange meetings and peer review meetings

For the national status quo reports, each project was free to develop its own methodology to gather data. This was necessary in view of the different starting points in the countries covered. A common template and outline developed by EACI aimed to ensure minimum consistency between all projects. In addition, a common data factsheet was requested from all BUILD UP Skills projects to facilitate the cross-reading of key data.

As a result, this overview report builds on a variety of data collection and analysis methods. The main sources of data and information were gathered from companies/employers, social partners, training providers (public and private professional schools, universities, colleges), governmental institutions (including regional and local authorities and public employment services), building and energy sector, associations, chambers, federations, consulting companies, research institutes, NGOs, banks as well as European and international organisations.

The following qualitative and quantitative research methods were prevailing in national reports:

- *Desk research* was used in all national status quo reports to analyse the sector, national policies and strategies, existing skills needs and training provisions, gather sector and skills needs statistics and identify preliminary list of barriers. Desk research included overviews of professional and scientific publications at both national and international level, studies commissioned and produced by organisations in both private and public sectors. Often and where possible national statistics were used to support findings. In some cases specific statistical queries for more detailed data from national authorities were carried out. Many countries also complemented their analysis with an overview of relevant legal acts and policy documents including strategies, concepts, plans and other background material.
- *Surveys*, regular or online, were carried out by about half of the country teams to review the current skills of workers and current training provisions, identify skills needs and identify barriers experienced by workers and businesses with regard to training in the field of energy efficiency and renewable energy. Respondents, depending on the purpose of the survey, were mainly employers, employees, social partners and training providers. The number of respondents to surveys per country varied widely, but in some cases reached a few hundreds, and even a thousand. Some countries have carried out separate surveys for different target groups;
- *Interviews*, face-to-face or over the phone, were also used by half of the countries, mainly to clarify, validate and explore further issues identified by other methods. Interviews were usually carried out with employers and training providers’ representatives, and less often with workers;
- *Discussion groups* were used by approximately two thirds of the country teams and included consultations with employers, employees, social partners, training providers
and other stakeholders. Some countries also used panels of experts to discuss preliminary findings, inform further research and validate the results of studies.

Some countries also used more specific methodologies. For example, competence matrix (Austria) and skill category matrix (Germany) were used to analyse and compare current training provision. Germany has also applied evaluation matrix to carry out its skills gap analysis. Hungary and Czech Republic have applied SWOT (strengths, weaknesses, opportunities and threats) analysis. Few countries (e.g. Estonia, Germany, and Romania) have carried out forecasts based on econometric, statistical or other methods. A number of countries (e.g. Denmark, Estonia, and Latvia) used scenario development to uncover possible educational shortcomings and needs for industry craftsmen to meet 2020 goals. Spain has used Delphi technique for determining and quantifying how the evolution of energy efficiency and renewable energy will develop from various points of view (economic, occupational and training). Germany has applied technology monitoring for identifying the relevant technologies which included expert meetings and conferences, desk research, patent research, monitoring the activities of research institutes, monitoring the R&D activities of companies and monitoring the application of new technologies by users. Meanwhile Norway and Greece have carried out specific studies on skills needs, to describe necessary skills and qualifications in the field of energy among groups of on-site workers.

Because BUILD UP Skills projects have used a variety of methodologies to compile or produce data, the findings of separate national reports may not always be aggregated and directly compared at European level. For instance, national reports use different classifications to define building and energy sectors or related occupations, as well as the BUILD UP Skills target group (on-site building workers and system installers, which mainly correspond to NACE economic activity code “Construction of buildings”\(^5\)).

Nevertheless, with the national data provided in the country factsheets and wherever possible, this overview report provides averages and relative values (in percent) based on different methods and sources\(^6\).

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\(^5\) “Construction of buildings” (NACE Rev.2 code F41).

\(^6\) This is done in order to eliminate outliers which are often present if triangulation of methods or sources (i.e. double or triplecheck of a result) is not applied. However the extreme values, if they seem logical, are provided to illustrate possible variations of the same issue across countries.
2. Characterisation of the building workforce

The first chapters of BUILD UP Skills national status quo reports provide a wealth of information related to the building sector and the building workforce. Although the national situations vary from country to country, common characteristics can be identified.

- The BUILD UP Skills target group (craftsmen and on-site workers) can be estimated at around 7.6 million workers and make up for around 57% of the construction sector.
- Quantifying the BUILD UP Skills target group proved to be one of the major methodological difficulties for many BUILD UP Skills projects given the complexity and diversity of the building supply chain.
- Despite the adverse effect of the financial crisis, the construction sector remains a major employer in the EU and is composed of a large majority of micro-companies.
- The Grey/shadow economy is important in this sector although there seems to be large variations between countries.
- The building workforce includes a relatively high proportion of lower-skilled workers.
- Several countries refer to the issue of migration of the building workforce. Some countries highlight difficulties in retaining highly specialised building workers (e.g. Estonia, Romania).
- The building workforce appears highly male dominated in the few BUILD UP Skills reports that have addressed the issue of gender.

Quantifying the BUILD UP Skills target group, craftsmen and on-site building workers

According to EUROSTAT 2010 figures, the main occupational category of BUILD UP Skills (craft and related trades workers) makes up for approximately 57% of all construction sector employees within the EU. In 2010, the EU construction sector employed 13.4 million workers, which would indicate that the BUILD UP Skills target group was around 7.6 million workers. Shares of craft and related services workers vary across countries from more than 65% (Italy, Sweden, Denmark), to less than 50% (Bulgaria, Latvia, and UK).

In the participating BUILD UP Skills countries, on-site building workers and craftsmen constituted around 10 million workers mainly in 2010-2011 according to BUILD UP Skills projects reports. The 5 largest countries alone (Germany, France, Italy, Spain and the UK) gather about 7 million BUILD UP Skills workers.\(^7\)

It was all the more difficult to quantify the BUILD UP Skills target group as the building sector supply chain is complex and diverse. In Figure 1 an example of how this complexity was illustrated in the Danish status quo report

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\(^7\) This attempt to quantify the BUILD UP Skills target group was one of the first methodological difficulties for the BUILD UP Skills projects as it was not always possible to find relevant data for the BUILD UP Skills target group, i.e. craftsmen, installers and other on-site building workers. Some countries reported data provided for the construction sector as defined by the Statistical classification of economic activities in the European Community (NACE code Section F), which encompasses the whole construction sector and not only the building sector. Some countries have used the building sector definition (NACE F41) including both the development of building projects and the construction of residential and non-residential buildings. Some countries have refined further their findings to better estimate the BUILD UP Skills target group considering the boundaries of professional occupations. For instance, the BUILD UP Skills Germany report has mapped occupational categories in various economic sectors (e.g. the manufacture of fabricated metal products and the manufacture of machinery, other metal building and association occupations, refrigeration engineers and technicians, and foremen).
The BUILD UP Skills Finland report summarises the fragmentation of the sector as follows: "A building project is implemented through networks that include - besides the main contractor - materials and component suppliers, companies belonging to the distribution chain, and service providers. Within the building industry, the logistics process affects the main contractor as well as other participants in the construction process. Building construction combines the products and services generated by many lines of business for clients’ buildings. The acquisition of products and services, organisation of deliveries to the construction site, as well as the site’s logistical planning and maintenance, are an integral part of a building project’s administration, and they essentially affect the construction’s productivity, profitability, and quality of the end result."

Another methodological difficulty for the BUILD UP Skills country teams is linked to dates of the data sets used by the various countries. Most countries have based their analysis on 2010 (e.g. BG, CY, DK, IE, PL, SE), and 2011 data (e.g. BE, EE, ES, IT, LV, NO, RO, UK). However, some countries have used data from 2009 (e.g. AT, PT) or 2012 (e.g.NL). Between these 2010 and 2012, the number of building workers may have evolved dramatically following the economic downturn.

The building sector remains a major employer in the EU...

According to Eurostat, the construction sector for which data is available accounted for approximately 6.4% of the total gross value added in the EU27 on average in 2010. Figures range from up to 5% in Ireland, Hungary, Germany and Denmark to more than 10% in Cyprus, Romania and Spain.

Many BUILD UP Skills reports emphasise that the building sector is a major employer in European labour markets and often the largest. In Bulgaria, according to data of the National Statistical Institute the construction industry engages about 7% of the employed persons and in this way construction stands out as the biggest industrial employer in the country. In Finland, approximately 10% of the gross national product is used in construction, and over
60% of the investments made in Finland are in construction. The real estate and building sector employs 20% of the workforce, or every fifth Finn. The sector provides jobs for 510,000 persons, when multiplicative effects of production are taken into account. Of the people employed, approximately one-third work in the real estate business, one-third on construction sites, and one-third in sector-related industrial and service fields.

...despite adverse effects of the financial crisis

Several BUILD UP Skills reports point out that the building sector has been one of sectors worst hit by the economic crisis in the past 4 years, with increased number of bankruptcies and higher rates of unemployment in the sector.

Effects of the financial crisis

<table>
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<tr>
<th>Country</th>
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<tbody>
<tr>
<td>Bulgaria</td>
<td>The building sector is one of the sectors worst hit by the economic crisis in the recent three years. According to data from the national statistics the drop in the construction output alone during 2011 was 2/3 as compared to the preceding year. At the same time, not so long ago were published the results from the regular survey, conducted by the National Statistical Institute among the managers of enterprises in the fields of construction, services and industry, which serve to “measure” the business climate in the country. It turned out that the majority of the respondents anticipate new drops for their businesses and personnel lay-offs during the 2012. The growth trend remains steady until 2009 at levels above 9% to strike a drop to 7.5% in 2010. The number of employees in construction sector decreased from 297000 in 2008 to 199000 in 2011.</td>
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<td>Cyprus</td>
<td>The contribution of the construction sector to GDP fell from 11.7% in 2008 to 7.8% in 2011; the share of employment fell from 12.1% in 2008 to 11.3% in 2010, but rose to 11.9% in 2011. The decline of construction activity after 2008 inevitably caused a significant increase in unemployment in the sector. In particular, the number of unemployed persons from the Construction sector rose from 1.299 persons (8.9% of total unemployment) in 2008 to 4.820 persons (15.3% of total unemployment) in 2011, registering an increase of 3.521 persons or 270%, which clearly indicates the negative impact of the extended economic crisis on the sector. There was a decrease in foreign demand for properties. The number of properties for which sale documents by foreign buyers were submitted decreased from 11281 in 2007 to 1652 in 2011.</td>
</tr>
<tr>
<td>Estonia</td>
<td>The recent crisis in the sector is considered the deepest crisis of the post-independence period. Construction volumes dropped by nearly half compared to the peak period, many companies went bankrupt and unemployment in Estonia rose to unprecedented heights. Many construction companies had to close up shop. Whereas in summer 2007, 87,000 people were employed in the construction sector, by the first quarter of 2010, the number had fallen to 40,000. In spite of the difficulties and complicated times, some positive aspects can also be highlighted: • thanks to the increased competition during the crisis, the construction sector is better organised and fly-by-night contractors have largely disappeared; • the crisis brought out significant deficiencies in legal acts governing fair competition and enterprise; • in the increased competitiveness of recent years, the competitiveness of Estonian construction contractors also increased, as attested to by the significant growth in export figures in the construction sector. Whereas the share of export in years past in the construction sector has fluctuated between 3-5%, in the first half of 2011, it rose to 10%.</td>
</tr>
<tr>
<td>Spain</td>
<td>The proportion of workers in the construction sector, with respect to the total of all producing sectors, has gradually reduced from 12.5% in 2008 to 7.8% in 2011.</td>
</tr>
<tr>
<td>Ireland</td>
<td>Any recovery in house building is unlikely before 2013. Thus any recovery in the volume of new residential construction is unlikely before 2013. The annual projections for 2010-2012 represent the lowest level of house building since records began in 1970. Public sector expenditure has been in decline since 2006 due to the economic downturn. Based on the extent of the contraction forecast, output in the industry declined by almost two-thirds between 2007 and 2011. In terms of the construction cycle, the current contraction in such a short time period is the most severe since records began in 1980, but may well be the most severe in the history of the State. The majority of larger building firms are focusing on securing overseas projects, particularly in the UK and the Middle East. The contraction has led consequentially to a dramatic drop in the number of workers employed in the building sector, from a peak of 280,000 in 2007 to just over 100,000 directly involved in 2011.</td>
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</table>
The construction industry suffered as a result of the financial crisis and the Euro crisis. Since 2009 investments, results and employment have decreased sharply. Interestingly, independent contractors are more numerous. They account for a significant percentage of total employment in the construction industry. In spite of the crisis, their share has grown rather than dwindled, from 13% 15 years ago, to a current 22%. It remains to be seen how this trend will develop in the next few years.

When comparing the different years, the growth of the number of dwellings decreases from almost 83,000 in 2009, to almost 56,000 in 2010 to slightly over 45,000 in 2011. Decreasing growth is explained by the economic crisis which started in 2008 and started hitting the construction sector hard in 2009 and 2010.

After a period of four consecutive years of annual growth, 2008 was marked by a zero variation, followed by a 2.5 GDP drop in 2009. Economic activity recovered slightly in 2010, with a 1.4 percent growth, but in 2011 it decreased again

In 2011 the Building sector reached the lowest level of employment, which did not exceed 418 thousand workers and was the lowest of the last 14 years. As reported in the 2011 INE Employment Survey, the average number of employed workers was 440.3 thousand, i.e. 9.1 percent of total employment (9.7 in 2010).

Unemployed workers from the Building sector correspond to 15.3 percent of total unemployment.

The crisis led to an increased number of bankruptcies and a reduction of licensed companies. Bankruptcies in the building sector correspond to approximately 18 percent of all bankruptcies recorded nationwide until September 2011.

In Sweden, the downturn in the economy which started in the last quarter of 2011 is continuing. The impaired pace of growth in the economy and the still pessimistic view of development held by householders means that the number of new homes under construction will be lower in 2012-2013 than in 2011. In 2012, the demand for services with a tax reduction for construction services in household properties has also declined, which has led to a fall in the level of investment for renovation. In 2013, the repairs of the property owners to their rental stock should start to take effect, which will lead to the volume of rebuilds increasing, at the same time as investment in new builds should start to increase again.

Constructions have been one of the most important sectors of the Greek economy: during the period 2000-2004 the sector contributed to the GDP by approximately 7%, with a maximum value of 8.8% at the fourth quarter of 2006, and more than 8% to the total employment. As Greece is going through the economic and social crisis, the constructions sector has gone from bloom to gloom over the last twelve years: since the fourth quarter of 2006 a rapid and continuous decline is observed, reaching 3.75% of the GDP in the first quarter of 2012.

As concerns the employment, 157,000 jobs were cut in the construction industry during the period 2008-2011, 150% more than the ones created for an entire decade (1998 - 2008). Constructions met the greater impact in employment than any other sector of the Greek economy. In particular, the 295,000 employees in the construction industry in 1998, increased to 402,000 by 2008, to fall at 213,500 during the second quarter of 2012, leading to a cumulative loss of 188,500 jobs.

Source: BUILD UP Skills National Status Quo reports

Majority of micro-enterprises in the sector

The large majority of companies operating in the building sector are micro-enterprises.

Micro-enterprises in the Building sector

<table>
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<tr>
<th>Country</th>
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<tbody>
<tr>
<td>Austria</td>
<td>77% of companies in the building sector (building trades and building industry) are micro enterprises with up to 9 employees; 95% of companies in the building sector had less than 50 employees</td>
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<tr>
<td>Belgium</td>
<td>Two thirds of the businesses are one-person companies. 21% of them have 1 to 4 employees. Only 1% of companies have more than 50 employees. Small businesses operate mainly in the residential market.</td>
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<tr>
<td>Cyprus</td>
<td>Microenterprises (1-9 employees) constitute the majority (90%) of enterprises operating in the sector and have a mainly localised character. In particular, the number of microenterprises increased from 2.916 enterprises in 2000 to 5.913 enterprises in 2010</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>Micro-companies with less than 9 employees (83.8%); small companies with 10-49 employees (13%); medium-sized companies with 50-249 employees (2.8%). The large companies with more than 250 employees account for hardly 0.3%.</td>
</tr>
</tbody>
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Germany
2011 saw a total of 348,039 companies operating in skilled building fitting and finishing trades. The skilled craft building, fitting and finishing sector is characterised by a plethora of small companies. Looking at the 2008 figures for the main construction industry, 56.2% of companies had fewer than 5 employees (including the owner), 22.4% had 5-9 employees and 13.3% 10-19 employees. Turning to the fitting and finishing sector, companies here are even smaller: Over two thirds (67.5%) of companies operated with less than 5 employees. 18.9% had 5-9 employees and 9.0% had 10-19 employees.

Estonia
According to Statistics Estonia data, over 9,600 companies in Estonia indicated construction as their primary area of activity in 2011. 91.69 percent of these were microenterprises with fewer than 10 employees; there are few companies in the construction sector with more than 250 employees.

Spain
The proportion of businesses with no salaried employees or with fewer than 10 salaried employees constitutes over 90% of the businesses in all sub-sectors, apart from the group of companies principally dedicated to other specialised construction activities.

Latvia
77% of companies were micro-enterprises (2010)

Netherlands
92.8% of all companies in 2009 were micro-enterprises with up to 10 people

Norway
90% of the companies have fewer than 10 employees, while 96% have fewer than 20 employees

Romania
86% of enterprises are micro (1-9 employees)

United Kingdom
The sector is largely supported by small and medium sized businesses with the vast majority of companies (around 99.2%) employing fewer than 50 people; 93% of enterprises employing fewer than 10 people

Sweden
94.4% of all construction companies were micro-enterprises

France
431,091 companies operated in the building sector in 2010. 251,819 (58%) with no employee. 154,139 (36%) with 1 to 9 employees

Source: BUILD UP Skills National Status Quo reports

Grey economy

Although there is limited data on the grey economy by definition, several BUILD UP Skills reports have tried to estimate its size with large variation between countries. In Sweden, it represents around 4% of the amount invested in the construction. In Spain, the grey economy is estimated at 29.3% of the GDP generated by the construction sector.

In Sweden, an interesting study shows that the tax deduction for property repairs is gradually changing the attitude of the public towards undeclared labour. A survey shows that 90% of companies consider that the household tax deductions for property repairs contributed to a reduction of undeclared labour in the construction industry. This is an increase from the already high level of 78% in 2009, when companies were asked the same question.

Grey economy

Austria
For the sector construction and crafts business (including repairs), the grey economy represent a damage of € 7,722 billion. These are 39 % of the total economy, and at the same time the majority of undeclared employment in Austria.

Bulgaria
According to the Bulgarian Construction Chamber the relative share of construction companies, which operate in the non-formal sector, had reached the levels of 15-20% within a period of 10 years.

Cyprus
Undeclared and illegal employment is a common phenomenon in the Construction sector. According to data of the Ministry of Labour and Social Insurance (MLSI) which are based on the results of 4,274 inspections of work sites from April 2009 to April 2012, 29.3% of workers at those sites were not declared to Social Insurance.

Spain
It is estimated that in 2009, 29.3% of GDP generated by the construction sector corresponds to activities completed outside of regulations.

Estonia
According to Estonian Tax and Customs Board data, in 2011 one in four construction companies – many of them small and microenterprises – were suspected of tax fraud: ~ 1,518 companies were suspected of VAT fraud (estimated loss borne by the state – 12.9 million €); ~ 1,737 companies were suspected of paying undeclared wages (estimated loss borne by the state – 9.7 million €).

Finland
The extent of the construction sector’s black economy has taken an upturn in recent years, and now causes annual damages totalling EUR 400-500 million in the building sector.

Latvia
Most of the detected persons controlled for unregistered employment worked in the construction sector – 713 people (24.1%).

Norway
According to an opinion survey carried out for the Directorate of Taxes in 2011, 20% of respondents had bought undeclared work in the last two years. The proportion of undeclared work
was high for tradesmen, such as painters (28%), bricklayers (21%) and carpenters (18%). For electricians and plumbers the percentage was 7-8%. This tends to indicate that undeclared work is more widespread for services that are less associated with risk if poorly executed.

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<th>Country</th>
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<tr>
<td>Sweden</td>
<td>A rough estimation suggests that the grey economy is responsible for SEK 10 billion (i.e. more than 1.1 billion euro), i.e., approximately 4% of the total sum invested in construction.</td>
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<tr>
<td>Poland</td>
<td>According to a study carried out in the last quarter of 2010 by the Central Statistics Office, 4.6% of the total number of employees is working in the black market. It was estimated that for the year 2010 construction and installations services as well as maintenance, repair and installation works are contributing 16.8 and 13.9% of the total Polish grey economy (2.1% of the Polish GDP)</td>
</tr>
<tr>
<td>Romania</td>
<td>One in three Romanian employees in the sector are working without legal forms, and the tax evasion resulting from unpaid taxes and social contributions costs the economy more than 2.7 billion per year. Currently there are 4.2 million employees, but the number of people working without legal forms exceeds 2.3 million according to Fiscal Council calculations. Data from the Employment Inspectorate shows that the most frequent applied fines for illegal work are in the trade and construction sectors.</td>
</tr>
<tr>
<td>Greece</td>
<td>One of the biggest issues that the Greek government has to face is the high immigrant illegal labour. Undeclared labour is a diachronic characteristic of the constructions sector. In a recent survey made by the Special Unit for Monitoring of Social Insurance (EYPEA) of the Social Insurance Institute (IKA) of Greece and the Labour Inspectorate (SEPE), it was found that from the total amount of inspected workers the percentage of unregistered labour raised from 12% in the prefecture of Magnesia (Thessaly) up to 78% in the prefecture of Arcadia (Peloponnesus). During the first semester of 2012, in 30,000 workers inspected, about 9,500 foreigners were found to work without any insurance coverage, and this number represents the 47.4% of the foreigners and the 35.4% of the total unregistered labour.</td>
</tr>
</tbody>
</table>

Source: BUILD UP Skills National Status Quo Reports

## A relatively high proportion of lower-skilled workers

Many BUILD UP Skills status quo reports highlight that a large proportion of the workforce is made up of lower skilled workers. However there are major differences between countries.

For example, in the United Kingdom, "a large proportion of the construction workforce is made up of lower skilled trade and operative workers (63% in 2009)". In Portugal, 86% of the 100,850 persons employed in the sector in 2009 had finished primary school (from age 6 to 15 years old) and 6% secondary schools (from age 15 to 18).

In Spain, "56.5% of employees in the construction sector have a level of education equivalent to the first stage of Secondary Education or lower, which contrasts with a considerably lower figure (38.5%) for the employees in other economic sectors. More specifically 38.9% of workers in the sector have reached the first level of secondary education and appropriate training, 14.6% have primary education as the limit of their studies, and 3% of employees have no level of education complete. In the construction sector, 9.7% of workers have completed some level of higher education while in economic sectors, this value is 26.9%. In Spain, the lower compulsory secondary education is studied in secondary schools, between the ages of 12 and 16. Primary education, provided in primary education schools covers six academic years, usually studied between the ages of 6 and 12.

In Sweden also, the level of education for the persons employed in the building sector is relatively lower than elsewhere in the Swedish labour market. The main difference lies in the percentage of persons that has continued studying after leaving school (8%) while the corresponding figure for the labour market as a whole is 28%. However, "in the long term, skills levels in the sector are increasing, due to retirements, as the majority of new skilled workers have a three-year upper secondary school education and technicians who previously had an upper secondary school education are being replaced by [technicians] who have been educated at a vocational college or at a university college/university."

In France, 46% of the 634,273 workers employed in the building sector in 2010 are considered low-skilled workers.
In Germany, 84% of the persons working in the identified BUILD UP Skills occupations have a vocational education and training qualification. Two thirds have an initial vocational education and training meeting the requirements of the middle level qualifications (3b and 4) in the International Standard Classification of Education.

Age and gender specificities

Regarding the age of the workforce, several countries highlight that the majority of the workers are aged between 25 and 54 (80% in Spain, 78% in Cyprus). For instance, the average age of a French building worker is 36 years old. 30% of building workers are under 30 years old in France.

Some countries specifically refer to the issue of an ageing workforce. In Germany, most of the workers are in the 35-50 age bracket. The 15-34 year old cohort is not large enough to fully replace the 35-50 year old cohort when the latter exits the labour market. Similarly, Sweden has observed a change in the age distribution of building workers between 1999 and 2009, “the 55+ age group has grown by 27%, from 16.8% to 21.4% of the workforce. This in turn, means that a larger proportion of workers is going to retire in the coming decade with considerably greater needs for new staff to replace them”. In the Netherlands, the question of retaining the expertise of older generations on their way out and transferring it to the young generation is raised. It is also placed in the context of an ageing European population and of a general lack of attractiveness of the construction sector for young employees.

Only a limited number of BUILD UP Skills reports refer to the issue of gender. Some of the reports confirm that the building workforce is highly male dominated. In France, only 1.6% of the identified BUILD UP Skills workers are women. In Germany, only 5.6% of the identified workers are women.

Migrant workers

Several countries refer to the issues of migration of the building workforce. Some countries (Estonia, Romania) highlight difficulties in avoiding the departure of highly specialised building workers to neighbouring or other EU countries. In parallel, Nordic countries (Sweden, Norway, Finland) note an increase in the number of foreign workers in the recent years. In Ireland and Spain, on the contrary, the number of foreign workers has decreased significantly with the economic crisis in the sector.

In Spain, the level of qualification of foreign workers is considered similar to that of the national workers while in Malta, foreign construction workers are described as "low skilled with limited employment opportunities".

### Migrant workers

<table>
<thead>
<tr>
<th>Country</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyprus</td>
<td>From 2004 to 2011, the number of EU nationals employed in Cyprus doubled. The number of EU nationals employed in Cyprus rose from 23,486 in 2004 to 48,455 in 2011. It is estimated that the Construction sector absorbed approximately one fifth of these people. In 2011 of total employment in the sector 31,590 were Cypriots, 10,722 EU nationals and 2420 Third country citizens.</td>
</tr>
<tr>
<td>Norway</td>
<td>The need for labour is one of the reasons behind the huge influx of workers from abroad in recent years. It is mainly the workforce from Eastern Europe that is growing. Fafo, the research foundation for labour and social welfare (on the basis of full-time equivalents), indicates that the number of employees from Eastern Europe increased from 4,800 in 2006 to 11,300 in 2008. According to data from the Federation of Norwegian Construction Industries (on the basis of issued ID cards), Poland, Sweden and the Baltic countries account for more than 75% of the foreign workers</td>
</tr>
<tr>
<td>Finland</td>
<td>Every fifth worker on a Finnish building construction site is a foreigner. In Uusimaa, foreigners already account for one-third of the workforce. The quantity of foreign workers has grown in recent</td>
</tr>
</tbody>
</table>
years at the same rate in Southern Finland as in the entire country; the number has tripled since the autumn of 2007 (The Confederation of Finnish Construction Industries 2011).

### Portugal

According to a study published in 2008, the percentage of foreign individuals among Portugal’s active population amounted to 5.6 percent, roughly 24 percent of which in the Building sector – particularly foreigners from Eastern and Southeast Europe. To these one must add unofficial workers (i.e. without labour contract) who may represent, in the building sector, approximately 34 percent of the migrant population.

According to the above study, in what concerns the educational background of the total foreign active population, 18.8 percent have secondary school/vocational courses and 7 percent university bachelor degrees/fist degrees. This does not differ significantly from the total active population – i.e. 18.7 percent with secondary school/vocational courses and 10.2 percent with university bachelor degree/first degree. There is however a gap between educational background and qualification level, as 59.3 percent of the foreigners have a semi-qualified, unqualified, apprentice-level or unknown profession, versus 38.5 percent of the total active population for those same levels of qualification. The percentage of foreigners with high educational background but low-to-medium qualified occupations is 36.6 percent (in 2005-2006), much higher than workers born in Portugal, 21.1 percent.

### Sweden

Companies within the building sector are hiring foreign personnel more regularly. The workforce comes from low-pay countries both within and outside of Europe. According to Byggnads, there is a sharp increase (Sydsvenska Dagbladet 03-02-2012) in terms of workers who come from a third country, i.e. from outside the EU. Four years ago, Swedish construction firms applied for permits to hire 25 workers who were not EU citizens. Last year, the figure had risen to 1,137 work permits, according to Byggnads. This sharp increase is probably due to the fact that the national regulations for workforce migration have been changed during this four year period.

There are no statistics regarding how common it is to hire foreign labour. When LO (the Swedish Trade Union Confederation) investigated the construction of the City Tunnel in Malmö, Citybanan and Norra länken in Stockholm, the organisation's report showed that approximately 45 per cent of the personnel had been hired in from other countries. In these cases, the percentage of foreign skilled workers and companies is due partly to the conscious strategy of the Swedish Transport Administration to make the Swedish construction market more competitive, and partly that there is lack of suitably educated personnel in Sweden with the necessary construction-oriented qualifications.

### United Kingdom

Migrant workers constitute around 6% of the workforce in Great Britain. In some of the larger cities, such as London, Birmingham or Glasgow, this proportion may increase to around 25%.

### Malta

Non-Maltese nationals make up for approximately 4.8% of the population (20086 persons) 52.9% of the non-Maltese nationals living in Malta are males aged between 25 and 34 years old. A large percentage is composed of low skilled tradesmen with relatively limited employment opportunities.

### Estonia

The significant decrease in workforce with specialised training among ventilation technicians, sheet metal workers and concrete workers may, according to experts, signal departure to neighbouring countries.

A study on workforce based on survey data from the Statistics Estonia showed that the number of employees in permanent positions abroad rose from 8,300 in 2009, 10,900 in 2010 to 13,200 in 2011. The same study showed that the number of people who had worked temporarily abroad during the year was 20-30% higher than the above figure. The actual numbers are probably much higher, but due to the survey methods, the Statistics Estonia data set is not capable of conveying precisely the actual number of workers abroad. A majority of the construction workers abroad are based in Finland (83-84 percent in 2010-2011, 67 percent in 2009). In 2011, builders made up 60 percent of all people who worked abroad and construction workers made up 70 percent of the Estonian residents who worked in Finland.

The annual surveys conducted by the Finnish construction association have shown that the share of foreign labour in Finnish construction has tripled in the last five years (2007–2011). Growth in the demand for foreign labour is projected to grow in the years to come as well. Namely, a total of 70,000 construction workers (5,000 workers per year) will retire in Finland in the next 14 years, and as the level of unemployment among construction workers is low, local construction worker resources are quite limited there.

On the basis of the survey, foreign labour accounted for an average of 20 percent already in 2011, with 33 percent in Uusimaa region. These figures show the workforce officially employed at companies, the more concealed spheres are not included. In total, an estimated 25,000-30,000 employees from abroad are working in Finland’s construction sector, based on research by the local construction association in that country. An increased need for foreign labour is projected in other regions as well besides southern Finland.
Key destination countries for workforce emigration also include Sweden and Norway, with the share of other countries much lower. The disparity in wages in this field between Estonia and Scandinavia is very large and it is not seen as converging in the near future. And thus emigration pressure in the construction sector will remain a strong influence on the labour supply.

**Romania**

“At national economy level it is estimated that one of four persons (27%) take into account seeking jobs abroad in the next three years. Moreover, only 21% of teenagers believe that in Romania one can obtain a job accomplishment easier than abroad.

The migrant workers are usually young people, between 18-40 years old with high working potential. An analysis of gathered data from the Urban Romania and Rural Eurobarometer surveys (Open Society Institute) have revealed that “40% of Romanians under 25 want to emigrate” i.e. “urban - 35.88 % and rural areas - 46.55%”. “Urban Romania” is a survey representative to the urban areas in Romania, which was conducted during July 2005 and April 2006.

In accordance with the recorded number of legal contracts, one in eight Romanians are working in countries other than Romania. The Workers Migration Office mediated employment contracts in countries like Germany, Spain, Switzerland, Qatar, the United States and Hungary. In addition to these figures, the number of Romanians which left Romania to work abroad, by means of private agencies, relatives or friends, should be taken into account.

**Spain**

The presence of foreign workers in the various sectors has been significant in the last decade in Spain, with the construction sector having the highest proportion of foreign workers employed in 2008 (25.1%). However, this proportion was reduced considerably to 19.8% in 2011. The qualification of immigrant workforce is equal to the national one: there is a clear need to professionalise the sector regardless of the worker's origin. R&D is performed outside the country. Some high qualified professionals, such as engineers or architects, are moving abroad in search of opportunities, especially to countries where the building sector is emerging. Since building practices vary between the different countries of Europe, competence-raising measures aimed at immigrant workers in building and construction will be important for ensuring the quality of execution.

**Ireland**

Migrant workers accounted for 13% of labour in 2006 at peak in construction sector, while currently this figure is now 8%. At peak employment in 2007, over 50,000 immigrant workers were employed in construction accounting for 17% of the workforce. This figure had reduced to 9,000 in 2011, with Irish nationals now comprising 92% of the total employed in the sector.

*Source: BUILD UP Skills National Status Quo Reports*
3. The EU policy context for training the building workforce

While qualification and training remains a competence of Member States, the EU policy context for the training of workers in the building sector is evolving with the stated objective to deliver Nearly Zero Energy Buildings.

- The importance of training the building workforce is recognised in several EU strategies and initiatives, as well as in EU legal instruments addressing the energy performance of buildings. Some instruments directly relate to on-site building workers and craftsmen, the target group of the BUILD UP Skills initiative: the Energy Performance of Buildings directive (EPBD), Directive 2010/31/EC, the Renewable Energy Sources (RES) directive, Directive 2009/28/EC, the Energy Efficiency Directive (EED), Directive 2012/27/EU. For example, certification and qualification schemes should be in place in all EU Member States for installers of renewable energy systems.

- In parallel, the framework for vocational education and training is also evolving with Member States implementing National Qualification Frameworks which are referenced to a common European Qualification Framework (EQF) in order to make national qualifications more transparent and comparable across Europe. This creates opportunities in the framework of the BUILD UP Skills initiative to develop qualification schemes based on learning outcomes and in line with national qualification frameworks, which can in turn help addressing the issue of cross-border workers activities.

- The EU provides support to projects relevant for the training of the building workforce via a wide range of funding programmes such as Erasmus+, the European Regional Development Fund, the European Social Fund, INTERREG and the Intelligent Energy Europe programme.

3.1 Qualification and training in energy related EU directives

The issue of “Skills and jobs” is high on the EU agenda and the Europe 2020 overarching strategy promoting smart, sustainable and inclusive growth. In 2010, the European Commission launched the “Agenda for new skills and jobs” This initiative is how the Commission will help the EU reach its employment target for 2020: 75% of the working-age population (20-64 years) in work. The “New Skills for New Jobs” initiative launched in 2008 set out the Commission’s agenda for better skills upgrading, anticipation and matching. Skills development forms one of the four main areas of this flagship initiative.

More specifically regarding the building sector, in 2012 the European Commission published a Communication on a “Strategy for the sustainable competitiveness of the construction sector and its enterprises”⁸. Improving the human-capital basis of the construction sector is identified as a key component of the strategy. The 2011 Energy Efficiency Plan⁹ also recognises the importance of training and refers to the BUILD UP Skills initiative as an instrument to “support Member States in assessing training needs for the construction sector, developing strategies to meet them, and fostering effective training schemes”, which could lead to recommendations for the certification, qualification or training of craftsmen.

⁸ COM (2012) 433
⁹ COM(2011) 109
The issue of training and qualification is also addressed as a horizontal issue in a number of EU legal instruments related to energy including the directives on the Energy performance of buildings (EPBD), on renewable energy sources (RES) and energy efficiency (EED), creating legal obligations for Member States on the availability of certification and qualification schemes (e.g. for renewable energy systems installers). The issue of mutual recognition between the Member States is also raised for some professions.


Recital 29 of the EPBD states that “Installers and builders are critical for the successful implementation of this Directive. Therefore, an adequate number of installers and builders should, through training and other measures, have the appropriate level of competence for the installation and integration of the energy efficient and renewable energy technology required”.

The EPBD also contains horizontal provisions on guidance and training in article 20 “Member States shall ensure that guidance and training are made available for those responsible for implementing this Directive. Such guidance and training shall address the importance of improving energy performance, and shall enable consideration of the optimal combination of improvements in energy efficiency, use of energy from renewable sources and use of district heating and cooling when planning, designing, building and renovating industrial or residential areas.”

More specific provisions are foreseen for “independent experts” in charge of delivering energy performance certificates and inspectors of heating and air-conditioning systems with the obligation to set up a qualification and/or accreditation system. Article 17 states that:

“Member States shall ensure that the energy performance certification of buildings and the inspection of heating systems and air-conditioning systems are carried out in an independent manner by qualified and/or accredited experts, whether operating in a self-employed capacity or employed by public bodies or private enterprises. Experts shall be accredited taking into account their competence. Members States shall make available to the public information on training and accreditations. Member States shall ensure that either regularly updated lists of qualified and/or accredited experts or regularly updated lists of accredited companies which offer the services of such experts are made available to the public.

No specific provision of this directive applies to craftsmen and on-site building workers.


The RES directive also recognises that “Information and training gaps, especially in the heating and cooling sector, should be removed in order to encourage the deployment of energy from renewable sources” in its Recital 49.

It includes specific provisions for RES installers (small scale biomass boilers and stoves, solar photovoltaic and solar thermal systems, shallow geothermal systems and heat pumps) in Article 14. For these professions, certification schemes or equivalent qualification schemes shall be available by 31 December 2012. Annex IV of the Directive includes a list of criteria to be fulfilled by the certification schemes. In addition “Each Member State shall recognise certification awarded by other Member States in accordance with those criteria.”

In 2012, the Concerted Action RES reported that not all Member States were ready with the set-up of the certification schemes for the 5 technologies mentioned. Only 35% of Member States were ready with the certification for boilers and stoves installers, 50% for PV installers, 40% for solar thermal, 20% for shallow geothermal and 40% for heat pumps. In addition, installers of RES technologies were considered a regulated profession in 40% of the Member States.10 This has implication for the mobility of workers and the recognition of professional qualifications.

This is directly relevant for the BUILD UP Skills target group.

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10 Source: [http://www.ca-res.eu/index.php?ei=tx_nawsecuredl&u=0&file=filename/dam/ca_res/public_downloads/working_group_summary/CA_RES_WG5_publication.pdf&t=1380811016&hash=43ec8b5734313d598479813c0b0d726d](http://www.ca-res.eu/index.php?ei=tx_nawsecuredl&u=0&file=filename/dam/ca_res/public_downloads/working_group_summary/CA_RES_WG5_publication.pdf&t=1380811016&hash=43ec8b5734313d598479813c0b0d726d)

The EED contains specific provisions on the training of energy auditors and energy managers. Article 8 on energy audit and energy management systems states that “Member States shall encourage training programmes for the qualification of energy auditors in order to facilitate sufficient availability of experts.”

In addition, the directive includes provisions on qualification, accreditation, and certification schemes for providers of energy services, energy audits, energy managers as well as installers of energy-related building elements. For these professions, Article 16 states that “Where a Member State considers that the national level of technical competence, objectivity and reliability is insufficient, it shall ensure that, by 31 December 2014, certification and/or accreditation schemes and/or equivalent qualification schemes, including, where necessary, suitable training programmes, become or are available.”

It also invites the Member States and the Commission to cooperate on “comparisons between and recognition of, the [certification and/or accreditation schemes or equivalent qualification] schemes”.

These provisions could be of direct relevance for the BUILD UP Skills target group of craftsmen and on-site workers.

3.2 The EU instruments for making qualifications more transparent

Alongside the sectorial instruments for the qualification and training of the building workforce, there exist other tools that aim to make national qualifications more readable across Europe and promoting workers’ and learners’ mobility between countries.

In this context, the European Qualification Framework (EQF) aims to act as a translation device to relate different countries’ national qualifications systems to a common European reference framework. The objective is to facilitate the understanding and comparisons of the qualifications levels of different countries and different education and training systems for individuals and employers. All new qualifications issued from 2012 should carry a reference to an appropriate EQF level. Member States are in the process of adapting their National Qualification framework to the EQF.

Other European transparency instruments that aim to increase the transparency of education and training systems in the field of vocational education and training are the European Quality Assurance Reference Framework (EQAVET) and the European Credit System (ECVET) for vocational education and training. While the common application of EQAVET shall build mutual trust between VET providers in different countries, ECVET shall document the accumulation of learning outcomes in various learning contexts (e.g. learning-on-the-job, work placement abroad) and their validation and, in fine, recognition across borders. Both instruments should ensure a better compatibility between the different vocational education and training (VET) systems in place across Europe and their qualifications. ECVET makes it more attractive to attend training and give people greater control over their individual learning experiences. It also facilitates the validation of learning outcomes acquired in non-formal and informal learning contexts11.

This is important for BUILD UP Skills projects as new qualification schemes supported by BUILD UP Skills should be built in synergy with the EQF. In addition, in view of the mobility of the building workforce, these instruments could facilitate the recognition of qualification and training between different countries and learning environments.

3.3 EU financial support to training the building workforce

The EU has provided support to a variety of pilot programmes, courses and projects relevant to the training of the building sector thanks to different instruments. The list below is non-exhaustive.

The Leonardo da Vinci strand of the Lifelong Learning Programme (2007-2013) has been funding practical projects in the field of vocational education and training, and some of them directly focus on the building and the construction sector. For instance, the project “InPhaseOut: Training course with intergenerational mentoring system regarding historical building reparation” (2012-1-NL1-LEO05-08715) aims to foster intergenerational competence-based learning through which older workers from the construction sector can exchange their knowledge and wide experience with young trainees for the renovation of historical buildings. The project “Mobility in Building Construction Sector through ECVET” (2012-1-PL1-LEO05-27451) aims to define and draft a model to provide accreditation, and to accumulate and recognise ECVET credits to assess and validate professional competences in the construction sector. The project A Pilot “Sector Skill Alliance on Energy saving and sustainable Construction in the Baltic Sea Region” was launched in 2012. The new Erasmus+ programme for education, training, youth and sports (2014-2020) will regularly support “Sector Skills Alliances”. Their objective is to ensure that vocational and educational training (VET) better responds to labour market needs and to promote cooperation between three categories of partners: the world of education and training (VET providers); sector-representative organisations with sector-specific expertise (including social partners, sector federations, Chambers etc.); and bodies regulating education and training systems (public or private bodies or authorities).

The European Social Fund (ESF) is the EU instrument for supporting jobs, helping people get better jobs and ensuring fairer job opportunities for all EU citizens. The European Social Fund is designed and implemented in a partnership between the European Commission and national and regional authorities. Each Member State, in partnership with the European Commission, agrees on one or more Operational Programmes for ESF funding for the seven-year programming period. Operational Programmes describe the priorities for ESF activities and their objectives. The EU distributes ESF funding to the Member States and regions to finance their operational programmes. With a budget of 10 billion euro a year, the ESF has financed a wide number of projects related to vocational training and lifelong learning opportunities. For instance, the ECO+ projects in Belgium aims to give workers the chance to train and gain skills in the new fields of ecologically friendly building construction and renovation. The SustainableConstruction (SusCon) project designed new education curricula that integrate learning across disciplines and trained 441 unemployed participants.

Besides the BUILD UP Skills Initiative, the Intelligent Energy Europe programme has also supported a wide-range of training projects. For instance for renewable energy installers, PVTRIN (01/05/2010 – 30/04/2013) aimed to train and certify of Photovoltaic installers in six European countries. QualiCert (01/07/2009 - 31/12/2011) encouraged a common quality certification and accreditation system for installers of small-scale renewable energy systems. Regarding the training of craftsmen, TRAINENERGY (01/10/2009-30/09/2011) trained 500 building craftsmen to offer intelligent energy solutions in the construction sector in 6 countries.

12 http://www.adam-europe.eu/adam/project/view.htm?prj=10208
13 http://www.adam-europe.eu/adam/project/view.htm?prj=10318
14 http://www.adam-europe.eu/adam/project/view.htm?prj=10338
15 Other IEE projects of interest on training the building workforce include GEOTRAINET, INSTAL-RES, İLETE, PASS-REG, CEPH, MOVIDA, REE-TROFIT, ENFORCE.
In terms of upcoming initiatives, various programmes such as COSME (Competitiveness of Enterprises and Small and Medium-sized Enterprises) or LIFE (the EU's financial instrument supporting environmental, nature conservation and climate action projects) also support training actions and capacity building projects.
4. Existing VET provisions

This chapter compiles information about the current situation regarding continuing (or further) vocational education and training (CVET) of craftsmen and other on-site construction workers and systems installers in buildings including any mandatory requirements / obligations and how the existing schemes are actually used. It firstly shortly overviews training provision existing in the national CVET systems and then also summarises courses and programmes on energy efficiency and renewable energies in buildings that exist, but are not yet part of national CVET systems.

- CVET systems vary across countries as significantly as conditions for participation of adults in learning. There are countries with highly favourable conditions for adult learning (i.e. AT, BE, DE, DK, FI, LI, LU, NL, NO and SE) and those with moderately or less favourable conditions (i.e. remaining countries of the BUS Initiative). Differences of countries in terms of conditions for adult learning are important to consider in all aspects of national education and training systems, labour market systems and related structures. They determine and at least partly explain variations between countries and thus need to be kept in mind when reading this report.

- Exploratory overview of national status quo reports showed that countries with highly favourable conditions for adult learning tend to have better developed accreditation structures, more certification possibilities, stronger capacity of the training providers and more advanced mechanisms to monitor labour market developments.

- However the overview also revealed that even in countries with highly favourable conditions for adult learning, skills related to implementation of EE and RES in buildings are not sufficiently integrated into the curriculum and their supply is not satisfactory in order to meet the 2020 energy targets.

4.1. The national system for VET of craftsmen and other on-site workers in buildings

This section gives a short overview of national CVET systems with training for building workers in order to effectively implement energy efficiency and renewable energy measures in buildings. It begins with a rough typology of national CVET systems and then briefly overviews some of their specifics including training providers, available accreditation structures, certification possibilities, the extent to which the current system already addresses skills for implementation of EE and RES measures in buildings and existing instruments to monitor market developments.

For the purpose of this report this section outlines groups of countries according to how favourable are their conditions for increasing participation of adults in learning. The typology provided should serve as a general framework for interpreting country-specific training information provided in this report.

A European Commission study on adult learning\(^\text{16}\) classifies countries based on the following main conditions for increasing participation of adults in learning: a) existence of specific barriers to participation in adult learning in the countries; b) context, both historical (i.e. existence of well-developed adult education system and of adult learning culture) and socio-economic (i.e. link between economic developments and awareness of importance of adult learning); and c) existence of governance structures and finances to boost adult learning.

(NB: structures and finances not necessarily coincide – there can be well established structures without sufficient financial resources). Another European Commission study adds additional insight on the distinctive features of similar VET systems: e.g. on level of institutionalisation of training, level of involvement of social partners in training, etc. Three groups of countries are singled out based on above-mentioned evidence: (1) countries with highly favourable conditions for adult learning; (2) those with moderately favourable conditions; and (3) countries in which conditions for adult learning are the least favourable. The Table below classifies countries into these groups, provides their main characteristics and indicates which CVET systems are more education and which - more labour market led.

Table 1: Classification of countries according to conditions for adult learning

<table>
<thead>
<tr>
<th>Group and countries</th>
<th>Main characteristics</th>
<th>More education led systems</th>
<th>More labour market led systems</th>
</tr>
</thead>
</table>
| **Highly favourable conditions for increasing participation of adults in learning: AT, BE, DE, DK, FI, LI, LU, NL, NO and SE** | • Adults face only minor barriers to participation in learning  
• Adult education is widely accessible  
• There are some situational barriers to participation, such as reconciliation of work, family duties and learning, funding of programmes and the lack of flexible provision  
• Well-developed structures in place  
• Strong lifelong learning tradition esp. in Nordic countries/ recently developed comprehensive LLL strategies in remaining countries  
• In some training is highly institutionalised (AT, DE) with strong social partner involvement or somewhat less institutionalised (BE, LU, NL) and moderate to strong involvement of social partners in CVET  
• Highest LLL participation rates in EU | DK  
FI  
NO  
SE | AT  
BE  
DE  
LI  
LU  
NL |
| **Moderately favourable conditions for increasing participation of adults in learning: CZ, EE, FR, IE, IS, PT, SI and UK** | • Satisfactory structures in place, but improvements are needed to bring participation to a higher level  
• Some countries have very well developed systems, but where attention towards the importance of adult learning is becoming less apparent  
• Some countries have been severely struck by the current economic crisis (for instance, IS and EE)  
• Relatively lower levels of employer input into training except for FR, IE and UK where social partner involvement is moderate to strong | CZ  
EE  
IS  
PT  
SI | FR  
IE  
UK |
| **Least favourable conditions for increasing participation of adults in learning: BG, CY, EL, ES, HR, HU, IT, LT, LV, MT, PL, RO, SK and TR** | • Major barriers for implementing policies for adult learning;  
• Lack of sound structures and funding to get adults involved in learning  
• Mostly inherited a highly centralised and state controlled system from the socialist period  
• In many countries other levels of education and training have more priority  
• Some countries have improved in recent years (PL)  
• Since the collapse of communism have followed a variety of paths in response to a variety of factors including inward investment, globalisation, the consequences of EU enlargement and domestic politics, to cite just a few. | BG, CY  
EL, ES  
HR, HU  
IT, LT  
LV, MT  
PL, RO  
SK, TR |


Different progress of countries in terms of creating CVET system which is favourable for adult learning and their different orientations towards the world of education and that of labour market can be illustrated with some country examples. For example, in Austria, a country with conditions that are highly favourable for adult learning, pupils have the opportunity to learn a craft within a dual apprenticeship after completing the nine-year compulsory education. The training starts with an apprenticeship contract between company...
and apprentice. The trainees receive a practical training in the enterprise and theoretical knowledge in vocational school. The school falls under the jurisdiction of the Federal Ministry for Education, Arts and Culture and the craftsmen profession under the particular guild of the Economic Chamber of Austria. The duration of the training depends on the chosen profession. Apprentices spend 80% of the training time in the company and 20% at school. This takes between 2.5 and 4 years with a total of 1260 hours in school. The training concludes with the final apprenticeship examination. Graduates thus have theoretical and very strong practical knowledge which eases their transition to the labour market. In Germany VET as a whole is very similar to the system of Austria. In the field of initial vocational education and training (IVET) companies are basically free to decide whether they take on apprentices and who they select while at the same time being subject to State regulations/ measures. The idea behind the strong role of the market in actively shaping VET programmes is that it helps orient IVET and CVET programmes towards market needs. Moreover, through the involvement of the social partners (employers and trade unions), acceptance for new regulations is increased in the sectors concerned.

Meanwhile countries with the least developed conditions for adult learning are characterised by less advanced national CVET systems which tend to be led by central government and/or world of education. For example, in Italy the change of the Constitution has led to the assignment of education and training directly to the exclusive jurisdiction of 20 Regions and two Autonomous Provinces. Due to this, VET in the country is extremely complex and it is not easy to establish common standards at national level. Another example is Romania which has not yet completed the development process of the national CVET strategy. At the time of status quo report (August 2012) there was no legislation ensuring the quality of CVET. In Slovakia, the cooperation between employers and VET system is voluntary and ad hoc. It is limited to certain forms of cooperation, such as field trips permitting students to exercise their profession and training, material or financial support, participation in specialised committees. Similar is the situation in Lithuania, where VET is still increasingly education led and where relationships with employers are more sporadic, depending on the initiative of separate persons in schools and not governed by nationally agreed strategy. Sectorial practical training centres are also emerging with a strong technical base for practical training.

Differences between countries in terms of conditions for adult learning are important to consider in all aspects of national education and training systems, labour market systems and related structures. They determine and at least partly explain variations of countries across different fields and domains of national systems and thus need to be kept in mind then reading this report.

**Training providers relevant to the building sector**

In most countries, training providers are upper secondary schools, vocational schools, vocational colleges, private training enterprises, etc. However, in some countries, other training providers have been identified. For example, Ireland has Skillnets which is a state funded and enterprise-led support body promoting and facilitating training and up-skilling with the objective of sustaining national competitiveness. Skillnets receives funding from the National Training Fund through the Department of Education and Skills. The training programmes on offer lead to a mixture of National Framework of Qualifications (NFQ) and non-NFQ accredited awards. In 2010, an Eco-construction Skillnet was formed, which supports the Irish Timber Frame Manufacturers Association with training programmes in eco homes, passive houses and retrofitting.

In Sweden, some vocational groups, such as concrete workers, floor layers, brick layers, painters, tilers, roofers and carpenters have the possibility to receive their entire education through company-based training, that is to say, employment as a traditional apprentice in a
company under the supervision of a fully trained skilled worker and where the theoretical part of the education is conducted as distance learning or with an industry approved training provider.

The aforementioned training providers are examples of innovative training provision. The capacity of many existing 'traditional' training providers to deliver training on EE and RES solutions in buildings is still weak (see also Chapter 6 on barriers). One element to build capacity amongst training providers is the accreditation of training providers.

**Accreditation for training courses**

Accreditation is defined by CEDEFOP as a “formal recognition that a body or a person is competent to carry out specific tasks. The accreditation of an education or training provider is defined as a "process of quality assurance through which accredited status is granted to an education or training provider, showing it has been approved by the relevant legislative or professional authorities by having met predetermined standards".

Accreditation structures seem to be better developed in countries characterised by relatively highly favourable conditions for CVET. Such countries as Austria or Belgium have rather well developed accreditation structures. Meanwhile in countries such as Slovenia, with somewhat less favourable conditions for adult learning, there are no accreditation structures for the courses and training schemes on energy efficiency and renewable energy sources in buildings.

According to the Hungarian report, through the accreditation process, accredited adult education provides a certain level of state-backed quality guarantee and benefits training providers (see Box below).

**Potential benefits for an accredited training provider in Hungary**

| **Application for training aid**: Pursuant to Government Decree, companies may be eligible for training aid for purposes of adult education, which shall be directed towards their employees (e.g. language courses or various professional training programmes). The training aid may be spent at any accredited adult training institution. |
| **Participation in tenders**: Currently, participation in virtually all training-related tenders is subject to institutional, and often to programme accreditation. |
| **Possibility to hold examinations approved by National Register of Vocational Qualifications**: Only accredited institutions are eligible to hold examinations. |
| **Prestige**: Clients, partners and participants all tend to have a greater level of trust in the courses offered by an accredited institution. The systems and processes used at accredited institutions are verified, which represents a certain type of quality assurance for the clients. |
| **Benefits of having accredited training programmes**: Under the VAT Act, courses in an accredited programme may be offered VAT-free. |

*Source: Hungarian status quo report*

**Certification for workers**

Certification is defined by CEDEFOP as a “process by which a third party gives written assurance that a product, process or service conforms to specified requirements." Similarly to patterns noticed in accreditation structures, certification for workers seems more widespread in countries with highly favourable conditions for adult learning. For example, in Sweden certification is provided for workers who have completed and passed the course of Passive house builder, solar heating installers, pellet boiler installers, cooling and heat pump installers, heat pump installers, well drillers and other occupations.
Meanwhile in countries with moderately favourable or the least favourable conditions for adult learning, certification possibilities are much more limited if they exist at all. For example, in Greece there is no “special” certification scheme for RES and EE installers in place. The majority of courses offered are not officially certified by a credible authority or a certification body. Vocational training in “green jobs” is a step towards the right direction, but the number of technicians to be trained, in this frame, is very limited (approx. 1200 all around Greece). In several Greek regions these courses are not available at all. In Lithuania a national qualification and certification system for workers in the construction sector is not yet developed, particularly in relation to construction of energy efficient buildings (including almost non energy using buildings). Similarly, there is no certification of construction sector worker professions in the vocational education system of Latvia. Poland also only plans to establish certification structures – it was announced that, in order to comply with the EU requirements and to ensure correct installation of new equipment and RES installations, the new regulations will include an adequate system of certification and authorization applicable to all entities installing RES equipment.

Certification is an important step towards full integration of EE and RES related skills into the national CVET systems. However, as the following section will show, it is still a target and not a reality for many countries. Actually in some countries, no skills related to EE and RES are integrated in the training curriculum.

The extent to which the current system already addresses skills for implementation of EE and RES measures in buildings

Analysing the current training provision proved to be a hard task for many countries. For example, Austria highlighted that training providers were very unwilling to provide information due to various reasons including competitiveness – some of the training providers fear that highly demanded courses could be offered by competitors if they publish their course and its participant information. Some countries, such as the United Kingdom, examined training supply using a keyword search in various databases. It was difficult for countries to determine the current training supply because the training offer is changing constantly – according to Austria, if the demand for courses is low or absent, courses are removed from the portfolio. So in many countries comprehensive information on training supply is unavailable. Thus assumption that training supply is insufficient could be somewhat misleading. What is clear, however, is that the overall quality of training courses needs considerable improvement in many countries.

It is even more difficult to determine to what extent EE and RES competences are integrated into the curriculum. For example, United Kingdom concluded that it is not clear whether the aspects relating to specific energy efficiency skills or knowledge were embedded within training courses. As employers seeking training would typically seek to identify this using a keyword search – for example ‘biomass’ – the resulting information could suggest that there are very limited (if any) options available to them. The Box below presents some country examples of the extent to which national VET systems address skills related to EE improvement and RES integration in buildings. It demonstrates that even in countries with highly favourable conditions for adult learning, EE and RES are not sufficiently integrated into the curriculum and their supply is not satisfactory in order to meet the 2020 energy targets.

### Examples of the extent to which national VET systems address skills related to EE and RES

**In Austria** the general further education offer in the areas of energy consulting, energy efficiency and renewable energies can be interpreted as distinctive. If the offer is considered differentiated, and only the target group of blue-collar workers is regarded, then the number of courses is rather limited.

According to the **Bulgarian** report, it can be stated with a high degree of confidence that the knowledge in implementation of innovative solutions for EE improvement and integration of RES in buildings is not adequately covered in the vocational training and education system. One cannot fail to note the absence of proposals for changes in the State Educational Requirements or the training plans and programmes, especially in comparison...
with the identified need of additional qualification and re-training of the specialists, above all in the field of application of RES in buildings.

In Estonia there is no overview to what extent skills related to EE and RES are dealt with in the current programmes. To address this, the country expects active cooperation between vocational schools and higher education institutions to prepare textbooks and guidelines and develop training methodology.

In Finland EE and RES are not yet fully integrated into CVET system. For example, according to the RES Directive, a training system leading to certification or a qualification should be in place by the end of 2012. This affects solar electricity, solar heating, bio cookers, and heat pumps. In late 2012, Amiedu – a Finland’s leading vocational adult education centre – will organise training related to solar electricity and solar heating. EU-certified training related to heat pumps is already underway at three separate educational institutions. In Finland, an actual qualification system, including installer register, will be completed only in late 2012.

In Hungary in architecture and engineering trade groups that might be potentially involved in energy retrofit projects (e.g. such as bricklayer, building insulation installer, as well as various qualifications related to building engineering, electro-technology and electronics, and the timber industry etc.) the competencies related to EE and RES have only been partially integrated at modular, task and competency level.

Ireland concluded that apprenticeship training for the building occupations does not emphasise energy performance or renewable energy technology in the curricula. In the main building related crafts, approximately 15,500 apprentices have been trained in Ireland in the period 2006 to 2011. The vast majority of these have had little or no exposure to the revised building regulations, new standards and emerging technologies within their relevant fields as part of this training. The array of newly introduced programmes related to energy efficiency and renewable energy deployment are generally technology specific and do not strive to provide learners with an understanding of the fundamental principles of low energy buildings and system efficiency.

Lithuanian example shows that progress of integrating EE and RES skills into the curriculum is different. Vocational schools are somewhat better prepared with regard to energy-efficient buildings compared to renewable energy technologies. The question of energy efficiency in buildings in Lithuania was raised 20 years ago (around 1992), and since then requirements were constantly increasing. Vocational schools in many cases already have suitable training programmes, personnel and training base which only need to be updated and supplemented in accordance with the new requirements for energy efficient buildings. Meanwhile in the field of renewable energy technologies vocational education in many cases is less adapted and requires greater attention including development of new programmes as well as update of existing ones.

In Norway, neither is there any system for achieving systematic CVET for tradesmen in the building industry nor schemes for ensuring the quality of the courses that are on offer. According to the Federation of Norwegian Construction Industries, tradesmen and skilled workers are the group of employees in the building industry who currently have the poorest opportunities for further education or in-service training. For tradesmen who wish to remain in their trades, there is no national system or offer of systematic education or craft or journeyman’s certificates. A number of organisations offer courses, but none of the courses offered is in a system for lifelong learning. Neither is there any official approval, accreditation or certification of courses offered or any national goals for content, quality or evaluation. This means that it is difficult to make a general assessment of the quality of further education and training offered to those who are already active in the building industry. The lack of development opportunities can also make it difficult to take care of and keep skilled workers and tradesmen and reduces the attractiveness of vocational training in the building trades.

In the scope of training related to EE and RES, at present in Poland there are no courses for blue collar workers. However in respect to the existing training programs, the education system currently enforces a core curriculum in the occupation of technician of renewable energy equipment and systems. On this basis, it is possible to create training programs related to the respective qualifications and to individual skills within the scope of a given qualification.

In Spain vocational education and training does not deal with all of the bases required to implement EE and RE, principally because it does not cover all of the related activities in the sector. The majority of available training for sustainable buildings is aimed towards highly-qualified professional profiles, and, as a result, there is a consensus that they are the principal intended audience since building sustainability depends largely on them. It is not, therefore, in this group that the largest collection of skills gaps are found, since the training currently available can answer the needs of this group. However, there is not sufficient training material directed at lower levels. Although the experts may consider specific technical training unnecessary, it may be convenient to provide a more general vision focused upon the activity being developed.

In Sweden training elements that have a particularly pronounced connection to energy-efficient building are still not included in the compulsory parts of the training of skilled workers in the building industry. There are only generic formulations in the three programmes’ qualitative targets that have a connection to sustainable building and energy aspects.

Source: BUILD UP Skills National status quo reports
Trainers are a key pillar in facilitating integration of knowledge and skills for implementation of EE and RES measures in buildings into the training process. A considerable challenge is to motivate trainers as it is up to them to decide how exactly they will incorporate EE and RES elements. A short overview of trends in the number and the qualification of trainers are provided in Chapters 5 and 6 of this report.

**Existing instruments to monitor market developments**

Some countries have set up instruments to monitor market developments including technological requirements, skills needs and training needs. The aim is to improve existing or to create new education and training programmes and/or plan the needs for workers either for whole economy and/or particular sectors.

Most of the countries with highly favourable conditions for adult learning and some with at least moderately favourable conditions tend to have relatively well developed monitoring systems. For example, in Germany, the Chambers of Skilled Crafts monitors market developments for separate craft trades and the Chambers of Industry and Commerce – those for non-craft trades. In Denmark, trade committees are responsible for continuous development of VET programmes. In Belgium, the sectorial training fund (fvb-fic Constructiv) together with the Belgian building research institute (BBRI) monitors market trends in the sector. In the United Kingdom, the Construction Skills Council – an independent, employer-led organisation operating across the country – is addressing skills needs within the building sector (e.g. it develops the Renewable Energy Skills Strategy for the UK).

However, such monitoring systems are not always in place in countries with moderately and less favourable conditions for adult learning. For example, in Bulgaria, a monitoring system still needs to be developed with the support from EU structural funds. In Estonia, a monitoring system exists but is highly decentralised (the forecasts are made at national level while monitoring are also carried out by vocational schools, private training providers, professional associations, companies) and the question remains whether efforts of different players are smoothly coordinated to lead to coherent and useful results. Meanwhile in Ireland there is no formal continuous skills monitoring structure, but there are a number of bodies which report on such skill needs on an ad-hoc basis to the relevant government departments. The existing bodies are fragmented with no organisation taking overall responsibility for this function. This approach has led to a number of uncoordinated initiatives which do not seem to be addressing the skills and knowledge gaps in the construction sector and the potential for transferable, cross-sector skills. A similar situation exists in Lithuania, where the monitoring system is fragmented with no institution taking the overall responsibility. This has also led to inconsistent and unsatisfactory results. There is also no coherent national monitoring system in Poland as there is neither a national forecast for the construction sector, nor industry-based monitoring tools while data is collected by training institutions (mainly at local level and for limited occupations) and the local employment agencies (whose data is not directly comparable since different collection methods are used). Fragmentation of the monitoring system is not always a bad thing provided that a good coordination of institutions and their actions is ensured. However if such coordination is lacking the system may underperform.

Monitoring systems are never ideal. Even countries with very highly favourable conditions for adult learning see room for further improvements. For example, in Finland the examination of the overall real estate and building sector revealed an extremely large number of possible career paths and required skills. For that reason, in the future it is planned to limit the sector’s forecasts to clearer sub-entities. Countries with weaker labour market monitoring have considerably higher need for improvements.
4.2. Courses and programmes on energy efficiency and renewable energies in buildings

This section summarises information on CVET courses and programmes which exist, but are not (yet) part of the national continuing VET system. It provides examples of such courses and programmes and briefly discusses their providers, types, content and examples. Importantly, information on private CVET courses and programmes is even harder to get than for courses in national continuing VET system. Thus information in this section should not be considered exhaustive.

Training providers, characteristics and target groups

Training providers of continuing vocational education and training courses and programmes for adults which are not part of national continuing VET system are very different across countries and may include the following organisations:

- Large construction companies with their own licenced vocational training centres;
- Companies which are manufacturers or importers of equipment, materials and system. Some of these companies also have licenses for their own centres for vocational training;
- Chambers, guilds and/or trade/professional associations which, for example, organise trainings or training initiatives to enhance quality of services in the enterprises working in the building sector;
- Public and private training organisations such as universities, colleges, institutes (e.g. institutes of technology), vocational schools, building schools (such as those in IT), other private training institutions;
- Agencies;
- Consultancy companies;
- Paritarian funds18, funds that are established, funded and managed by the social partners themselves, which often play a role in vocational training activities.

Often courses and programmes are offered with the support of EU funds, and are used by employers to improve the qualifications of their employees during a change of the scope of company activity or its expansion. Usually training courses and programmes for adults which are not part of national continuing VET system have the following common features: lack of cyclical occurrence and follow-up; uncertain program quality; occasionally selected training staff; and quality of the entire course and its effect for the participant that are difficult to establish.

Most of training provision in case of courses and programmes which are not part of national continuing VET system is directed towards the needs of self-employed or workers at enterprises. Countries differ in terms of target groups of these courses. For example, in Estonia more attention is paid to training such occupations as construction finishers, carpenters, bricklayers, welders or electricians as these occupations are among the largest target groups in the building sector. The Estonian report also estimates a growth in the volume of training for plumbers, ventilation technicians and electricians. Meanwhile, the Irish report indicates that construction skills that fall outside of the formal apprenticeship system include concrete workers, steel workers, roofers and glaziers. Thus, the target groups of courses and programmes that are not part of national continuing VET system may differ quite substantially across countries.

18 http://www.paritarian-funds-construction.eu/ provides an overview of paritarian funds for the construction sector in the EU
Types of training courses and programmes

Training is usually provided in the form of in-house seminars and product trainings. The latter are usually developed and provided by manufacturers/suppliers of building energy efficiency systems and products and became especially widespread in recent years. For example, in Slovenia a large number of trainings are prepared and provided by producers/suppliers of materials and products (e.g. insulation materials, bricks and windows), systems (e.g. facades, roof systems), HVAC and electrical installations, machines and equipment for installation. In Lithuania, in large enterprises the implementation of new technology or solutions on the construction site is carried out under the supervision of manufacturers or suppliers of technologies, so the existing blue-collar workforce skills factor is often not even considered. These companies assume that relevant skills will be learned when the need arises in the course of construction.

Usually product trainings are short, intensive and include both practical and theoretical parts. For example, in Slovenia producers run intensive, targeted trainings which include also the basic information about theory, demonstration part and practical trainings. Slovenian producers also have good training facilities, with mock-up installations, internal certification and timeline of required trainings in specific period of time.

Usually product trainings are prepared and provided by manufacturers/suppliers with an aim to ensure the correct onsite implementation of their systems so that claimed performance may be achieved. The emergence of product/system specific training courses that are run by companies in the sector may be indicative of an industry perception of a gap in the existing formal CVET provision. Thus to strengthen formal CVET system it may be useful to spot and focus on the most popular categories of product training courses and programmes. The latter include thermal insulation and air tightness systems for building fabric (e.g. courses in Ireland and Poland), renewable energy heating and other technologies (e.g. courses in Austria, Finland, Ireland and Poland on air and geothermal heat pumps, wind generators, solar collectors, and solar panels) and energy efficient techniques (e.g. courses on effective and energy saving use of pumps in installations or construction of energy efficient single layer walls in Poland). This partly reflects overall content of courses and programmes that are not part of national CVET system (see other section).

Content and examples of training courses and programmes

Courses and programmes that are not part of national continuing VET system usually fall outside of any existing training information systems. Few countries have carried out surveys with an aim to improve understanding of existing courses and programmes that are not part of national CVET systems. For example, Germany has carried out an extensive survey of CVET programmes offered by the chambers, guilds and trade associations. Responses covered a total of 329 CVET programmes from 72 institutions and included participation numbers for 2009-2011. The information was aggregated by building work (building envelope, building infrastructure and building energy supply) and process work (provision of advice, planning, execution, customer acceptance, repair and maintenance and disposal) categories. German example provided in the Table below illustrates which type of building and process work categories are the most popular among participants.
### Table 2: Participation numbers in Germany CVET programmes (total of 2009-2011) by process and building work subcategory*

<table>
<thead>
<tr>
<th>A building’s envelope</th>
<th>Provision of Advice</th>
<th>Planning</th>
<th>Execution</th>
<th>Customer Acceptance</th>
<th>Repair &amp; maintenance</th>
<th>Disposal</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shell</td>
<td>4754</td>
<td>4408</td>
<td>1762</td>
<td>2761</td>
<td>1700</td>
<td>1209</td>
<td>16594</td>
</tr>
<tr>
<td>Roof</td>
<td>7418</td>
<td>6836</td>
<td>2829</td>
<td>4273</td>
<td>2727</td>
<td>2060</td>
<td>26143</td>
</tr>
<tr>
<td>Facade</td>
<td>6814</td>
<td>6382</td>
<td>2725</td>
<td>4278</td>
<td>2668</td>
<td>1945</td>
<td>24712</td>
</tr>
<tr>
<td>Windows and doors</td>
<td>6127</td>
<td>5670</td>
<td>1984</td>
<td>3452</td>
<td>1806</td>
<td>1409</td>
<td>20448</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A building’s infrastructure</th>
<th>Provision of Advice</th>
<th>Planning</th>
<th>Execution</th>
<th>Customer Acceptance</th>
<th>Repair &amp; maintenance</th>
<th>Disposal</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interior walls and floors</td>
<td>3861</td>
<td>3469</td>
<td>1486</td>
<td>2557</td>
<td>1882</td>
<td>1157</td>
<td>14412</td>
</tr>
<tr>
<td>Electric s</td>
<td>4791</td>
<td>4601</td>
<td>2301</td>
<td>3332</td>
<td>2355</td>
<td>1643</td>
<td>19023</td>
</tr>
<tr>
<td>Heating</td>
<td>12609</td>
<td>6854</td>
<td>8744</td>
<td>4114</td>
<td>8600</td>
<td>1888</td>
<td>42609</td>
</tr>
<tr>
<td>VAC</td>
<td>2944</td>
<td>2849</td>
<td>883</td>
<td>1758</td>
<td>865</td>
<td>743</td>
<td>10662</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A building’s energy supply</th>
<th>Provision of Advice</th>
<th>Planning</th>
<th>Execution</th>
<th>Customer Acceptance</th>
<th>Repair &amp; maintenance</th>
<th>Disposal</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geothermal systems</td>
<td>2913</td>
<td>2944</td>
<td>1382</td>
<td>2330</td>
<td>1259</td>
<td>967</td>
<td>11695</td>
</tr>
<tr>
<td>Biomass systems</td>
<td>1882</td>
<td>1796</td>
<td>872</td>
<td>1254</td>
<td>918</td>
<td>796</td>
<td>7518</td>
</tr>
<tr>
<td>Solar heating</td>
<td>4345</td>
<td>4305</td>
<td>2126</td>
<td>3002</td>
<td>2053</td>
<td>1427</td>
<td>17258</td>
</tr>
<tr>
<td>PV systems</td>
<td>4674</td>
<td>4562</td>
<td>2550</td>
<td>3417</td>
<td>2526</td>
<td>1570</td>
<td>19299</td>
</tr>
<tr>
<td>CHP systems</td>
<td>2944</td>
<td>2878</td>
<td>1257</td>
<td>2048</td>
<td>1296</td>
<td>1067</td>
<td>11490</td>
</tr>
<tr>
<td>Wind turbines</td>
<td>699</td>
<td>699</td>
<td>518</td>
<td>314</td>
<td>420</td>
<td>238</td>
<td>2888</td>
</tr>
<tr>
<td>TOTAL</td>
<td>66775</td>
<td>57953</td>
<td>31419</td>
<td>30790</td>
<td>31085</td>
<td>18119</td>
<td>24415</td>
</tr>
</tbody>
</table>

* Due to the structure of the questionnaire, multiple entries were possible for both building work subcategories and processes.

Source: National status quo report, Table 58.

The above Table illustrates that in the German case in the building’s envelope category, the subcategory roof is the dominant CVET participation field, followed by the façade, windows and doors and the least popular shell subcategory. In the building’s infrastructure category, the dominant subcategory is heating, while other subcategories were considerably less popular among participants. Finally, in the building’s energy supply category, most of training was carried out in photovoltaic systems and solar heating, followed by geothermal, CHP and biomass systems. Meanwhile in process work category, provision of advice and planning were the main focuses of the CVET programmes.

Based on the survey of 14 training companies and professional associations, the Estonian national status quo report estimated that approx. 10-15% of all training courses and programmes that are not part of national CVET system deal with building energy efficiency. Examples of such courses include the following: building internal climate and energy efficiency, energy efficient wood buildings and wood as an environmentally beneficial construction material, energy management, energy-efficient buildings, construction structures and energy-efficient buildings design and construction of energy-efficient homes.

The National status quo report of Poland demonstrated that very similar numbers of participants attended training courses in energy efficiency and renewable energy services areas (10256 and 10457 respectively). In the renewable energy services area, solar systems was a dominant subcategory (6459 participants), followed by heat pumps (3068), biomass fired boilers (790) and cogeneration (with biogas, 140).

Meanwhile interviews with 41 experts from construction and electrical installation in Slovenia revealed that the most popular courses that were not part of national CVET system were related to thermal insulation systems (1585 participants). This was followed by courses on construction materials (720 participants) and those on doors, windows and shading systems (425 participants).

Examples of courses and programmes in some countries are provided in the box below.
Examples courses and programmes that are not part of national CVET system

<table>
<thead>
<tr>
<th>Country</th>
<th>Courses and Programmes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>Energy advisor (buildings); photovoltaic systems; solar heating; insulation, air tightness; energy related construction and refurbishment; energy efficient/ passive houses; and training acc. to Energy Efficiency Act and Heat Act.</td>
</tr>
<tr>
<td>Italy</td>
<td>Insulation systems for building fabric; air tightness systems for building fabric; renewable energy heating technologies and ecological Building Systems.</td>
</tr>
<tr>
<td>Latvia</td>
<td>Training programmes or courses that fall outside formal education include the following: professionals involved in renewing and upgrading the thermal insulation of building shells (including renovation) and creating thermal building shells for new buildings; professionals involved in the choice, maintenance, setting up, regulating and replacing installations in existing buildings as well as professionals involved with choosing, installing, setting up and regulating sustainable energy installation in new buildings; on-site supervisors to warrant effective instruction, control and validation of work on the thermal shell as well as application of the energy systems; and professions at middle management level: advisors, calculators, constructors, etc.</td>
</tr>
<tr>
<td>Slovenia</td>
<td>Facades, insulations, hydro insulations; managing daily light; energy-efficient house; new technologies in EE/RE; good practices in EE/RES; blower door tests implementation; installation of windows; brick EE houses; HVAC; measurements of electrical installation; external lighting.</td>
</tr>
</tbody>
</table>

Source: National status quo reports

The above have identified trends of more popular themes and contents of training courses and programmes are not part of national CVET system. Although analysis in national reports suggests that short courses dominate in the market, some reports (e.g. Estonian report) suggest that recently some longer and more comprehensive training programmes were introduced. This may show that importance of area is increasing. Some Estonian companies have even mentioned their desire to specialise more than in the past on training activity at the engineer level.
5. Skills gaps between the current situation and the needs for 2020

This section provides an overview of the general and specific (i.e. by occupation) labour market trends, training, skills and qualification needs identified in the BUILD UP Skills national status quo reports.

- Most European countries will experience at least a slight shortage of building workers by 2020 (the median of the highest estimates is one fifth of the current workforce). However the need for training of the current workforce is much stronger than the estimated need for additional number of workers (the median of the largest shares of workforce requiring additional training was 48%). This highlights the importance of continuing education for the current workforce.

- The EU building sector mostly experiences skills gaps (i.e. vacancies filled/ jobs done with incomplete skills set) rather than skills shortages (i.e. vacancies not filled/ jobs not done due to the lack of people with at least some knowledge, skills and competences). Data suggest that there is an urgent need to up-skill existing workforce, not to re-train it[^19].

- Carpenters and joiners, bricklayers and stonemasons and building electricians are the most frequently mentioned occupations identified as requiring additional training. When detailed data is provided, these occupations are also those with the highest numbers of workers requiring additional training and those with the highest demand expected in the labour market. Thus the training needs of these occupations are important to address under the BUILD UP Skills Initiative.

- However, the national status quo reports also identify specific skills needs for other occupations. Many reports point to the importance of transferable and cross-trade knowledge and skills related to the energy performance of buildings.

- The current qualification courses and schemes required for the energy performance of buildings, as well as the training and accreditation structures for carrying out these courses are not satisfactory and are underdeveloped even in countries with highly favourable conditions for adult learning.

This reinforces the need to foster the up-skilling of workers including support for training trainers and improved monitoring systems to prevent skills gaps in the sector.

5.1. Labour force evolution

This section provides a short overview of the estimations of the additional number of workers needed in the building sector by 2020 by the BUILD UP Skills projects.

[^19]: **Up-skilling**: Short-term targeted training typically provided following initial education or training, and aimed at supplementing, improving or updating knowledge, skills and/or competences acquired during previous training.

**Re-training**: Training enabling individuals to acquire new skills giving access either to a new occupation or to new professional activities.

5.1.1. General estimates of the number of workers

Most countries have provided projections of workers in the building sector that will be needed to meet 2020 energy targets. Most countries have indicated that there will be, at least, a slight shortage of relevant workers by 2020. Additionally, many reports highlight that the need for additional workers could be higher than estimated considering a number of factors affecting the future supply of workers (see Box below).

Examples of factors affecting future supply of workers in the sector

<table>
<thead>
<tr>
<th>Source: National status quo reports</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Some national status quo reports demonstrate that even if there is sufficient supply of graduates in the country, it could experience significant lack of workers by 2020 and would not be able to meet energy targets by this period. Country experiences show that lack of workers in the future may take place due to the following reasons:</strong></td>
</tr>
<tr>
<td><strong>Growth of the industry:</strong> Most of optimistic forecasts in the Annex 1 are based on scenarios assuming return to at least modest levels of growth in the building industry. This in itself carries an assumption of at least some level of economic recovery;</td>
</tr>
<tr>
<td><strong>Emigration of workers out of the country:</strong> Baltic States and other Eastern European countries are losing workers in the building sector as many of them chose to work in other European countries primarily due to differences in salaries paid in these countries. For example in case of Estonia one third of workers who leave the sector are headed abroad. Pressure favouring the migration of workforce to neighbouring countries with a higher wage level is likely to continue as significant convergence of wage levels is not realistic in the near future;</td>
</tr>
<tr>
<td><strong>Demographic trends (declining birth rate):</strong> For example, in Latvia birth rate is negative meaning that there are more deaths than births. In Austria, birth rate is falling since 1960s. Thus number of young workers entering the sector is constantly decreasing;</td>
</tr>
<tr>
<td><strong>Decreasing education supply:</strong> In Austria, declining numbers in apprenticeship beginners. In Estonia in recent years there have been 900-1,000 graduates per year in the construction field in vocational educational institutions. Admissions are down in 2010-2011, and thus the number of graduates in 2013 may be as low as 800. To ensure that the necessary replacement workforce is trained, admissions to vocational education must be increased significantly. However decreasing education supply is result of demographic trends (declining birth rate) which affect all sectors proving any measures to increase education supply very difficult.</td>
</tr>
<tr>
<td><strong>Occupational flexibility of the workforce:</strong> In Estonia of graduates in construction specialities in vocational schools are not employed in work in their speciality or do not work for other reasons. This fact may reduce the number of new hires to as low as 600, which is much lower than even the most conservative forecast for workforce needs in the sector. In Germany although only about half of the skilled blue collar workers actually stay in the occupation in which they were originally trained, they still account for two thirds of those working in the corresponding occupational fields. The remaining one third is recruited for the most part from workers without any formal qualifications, and less from skilled workers from other occupations. Those who do not find work in the speciality are a very important potential workforce resource which could be brought back to the employment market through better cooperation between vocational schools and business;</td>
</tr>
<tr>
<td><strong>Changes in educational qualifications and workforce supply:</strong> For example, in Germany a trend towards higher-level educational qualifications can be seen, as witnessed by the rising share of academic qualifications. Looked at from a purely quantitative perspective, the drop in the number of younger workers as a result of the demographic development, coupled with the changing educational patterns, has the potential to lead to a shortage of skilled blue collar workers with middle-level skills in certain fields. Companies will therefore in the future increasingly have to face up to the fact that they will not always be able to cover their demand for skilled blue-collar workers with people with exactly the right qualifications;</td>
</tr>
<tr>
<td><strong>Health and safety:</strong> Building sector employees suffer from chronic diseases which limit the possibility of employing the workers in many jobs, for example, for working in high elevation and other jobs which are essential in energy efficiency improvement work. Countries such as Latvia face this problem in attracting workers in EE and RE related jobs due to health and safety concerns;</td>
</tr>
<tr>
<td><strong>Age:</strong> In Latvia at the age around 60 it is likely that 90% of employees will not be able to continue their work in the construction sector. Estonia estimates that roughly close to 3% of existing workers who leave due to age-related reasons must be replaced each year. Finnish report provides estimates that as much as 45% of the construction sector’s workforce will be retiring by 2020;</td>
</tr>
<tr>
<td><strong>Level of implementation of government policy actions:</strong> The Irish National Energy Retrofit Programme is currently supporting the employment of approximately 4,500 workers. Initial estimates for the programme indicated a figure closer to 20,000 will be required to achieve the improvements to 1 million buildings by 2020. An escalation of activity in this sector and a move towards ‘deeper’ retrofit approaches will inevitably lead to a significant increase in demand for skilled labour;</td>
</tr>
<tr>
<td><strong>Changes in regulatory framework:</strong> Austrian status quo report indicates that changing regulatory framework such as EU guidelines, building codes, directives and increasing technical requirements, demand for further training of sector workforce. Increasing training demands are particularly high for craftsmen in group F41 (building) and F43 (site preparation, installation work and finishing construction), as well as chimney sweeps.</td>
</tr>
</tbody>
</table>
In many countries, a combination of these factors will mean that it will be challenging to achieve the established climate and energy targets of 2020 because of the lack of workers. Not only will it be necessary to increase the number of graduates in Vocational Education and Training schools and to up-skill existing workers, some countries also highlight they may also have to attract additional workers from abroad.

The labour force evolution should be carefully analysed considering the national context and country-specific issues. For example, although Germany determines a mathematical supply-side surplus at the national level, there may be some regional labour shortages in the selected building occupations (in case labour demand develops in line with the demand projections of the alternative scenario and there is no increase in supply). Meanwhile in Finland finding enough sufficiently skilled employees proves very difficult. This has for its part opened the country’s building markets to a foreign workforce and irregular employee relationships, creating a situation in which work ethics and professional expertise are, according to some estimates, declining. On the other hand, the image of the building sector is changing with increased attractiveness of training sectors. The sector is no longer “the last chance” for young people. To address the lack of skilled employees country must opt in two ways - recruit skilled personnel from educational institutions and train current unschooled building workers in the workforce, many of whom lack even basic training in the sector. Adequate anticipation and management of skills needs of the BUILD UP Skills workforce is thus essential task to meet 2020 energy targets.

5.1.2. Estimates of number of workers by occupation (ISCO)

Electricians/electrical equipment installers, carpenters/joiners, plumbers, RES installers, bricklayers and insulation workers are occupations with the highest demand in the labour market. Most of the countries indicated that these occupations will need the largest numbers of workers in order to meet 2020 energy efficiency objectives. Most of the data from factsheets is based on quantitative estimates derived from forecasts, collected statistical or similar information. However, few countries also provided qualitative estimates based on expert assessment (e.g. Czech Republic, Spain and Slovakia) or surveys of companies and/or training providers (e.g. Estonia, Hungary). The level of details of country estimates varies significantly. Although most countries identify particular occupations, some indicate very broad categories of occupations such as ‘building employees’, ‘construction operatives’, or ‘technicians’.

Germany is one of the few countries which experience – based on the calculations - does not have nationwide shortages until 2020. That does however not mean that there will not be regional shortages of skilled building workers before 2020. In Germany over-supply of people with an IVET qualification is the greatest in metal building, plant construction, installation and technical draughtsmen occupations. The German analysis suggests that the share of workers with a formal IVET qualification in particular occupation may be used to identify the balance of labour supply and demand in this occupation. According to the German BUILD UP Skills report, the imbalance between those with a formal IVET qualification and those actually working in the respective occupation has an effect on the employment patterns of those concerned. Not all those with a formal IVET qualification in a specific occupation are able to actually work in that occupation, meaning that instead they take up other occupations. The other side of the coin is that those occupations where the supply of workers with an appropriate IVET qualification does not meet demand are dependent on an immigration of people with other qualifications or people without any formal qualifications. The ratio of those with a formal IVET qualification to the employment needs in a specific occupation can therefore be seen as an indicator for the extent the demand for skilled workers is covered. The lower the coverage, the more difficult it is to recruit people with the right qualifications.
This is further illustrated by Belgium which provides analysis of the origin of the total intake equal to 21,167 construction workers in 2010. 7,357 workers (35%) originated from a training system (or through temporary work), 5,147 (24%) are re-entrants, i.e. workers who have come back to work in the construction sector again. The remaining intake (8,663; 41%) consists of newcomers who cannot be traced. This undefined intake consists of individuals who cannot be tracked down in construction training courses. Accordingly, these are possibly young people who have attended a training course outside construction education (catering, engineering, etc.). They could also be older employees who have come in from another sector. What is indeed clear is that these people have no experience within the construction sector and/or did not have the benefit of basic training that prepares for work in the construction sector. This group therefore lacks any construction-related qualifications. Thus the lower the share of those with formal qualifications, the higher may be the need for training.

The turnover of building workers, their migration to other occupations or even sectors, the changing levels of unemployment or the status of workers (e.g. increasing self-employment) affect the estimates of additional number of workers by 2020 by occupation. For example, in Belgium of the estimated 159,500 workers employed in 2009, around 34,500 (22%) have changed employer. Of these 34,500, around 14,000 (41%) have changed employer within the sector. Around 20,500 workers (13%) have left the sector. This includes some 2,000 people under natural wastage: they are on (early) retirement, long-term unfit for work, deceased, etc. Of these 20,500, the remaining 18,000 workers have transferred to another sector, are unemployed of have changed status (clerical or self-employed).

Some further examples of relevant issues concerning estimating labour demand by occupation or skills is provided in the Box below.

**Estimating the number of workers by specific skills requirements and/or occupation: the example of Cyprus**

<table>
<thead>
<tr>
<th><strong>Limited number of skilled workers with the identified specific skills:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>In view of the limited amount of highly energy efficient building and the limited number of systems installed with high level of performance, a first assumption made in the case of Cyprus is that there are limited skills related to energy efficiency and RES installation in buildings and that education and training measures will have to start from scratch in the labour force.</td>
</tr>
</tbody>
</table>

**System maintenance needs:** The estimations of the number of workers requiring up-skilling include a provision for the number of skilled workers that will be responsible for the maintenance and repair of installed systems per year. These needs are considered to be particularly important for the proper operation and performance of the systems and are expected to increase further due to the annual increase of installed systems by 2020.

**Time scheduling of the installation of systems based on the National Action Plans:** The estimation of the minimum number of persons with specific skills is based on the assumptions and estimations for the annual number of systems installations required by 2020 in order to achieve the relevant targets specified in the national action plans, whereas the man-hours required for the installation and maintenance of systems are estimated based on common practices followed in Cyprus.

**Geographical and time restrictions:** For the calculation of the minimum number of persons with the specific skills, two incremental factors have been taken into account, which compensate for the restriction regarding the geographical distribution of the skilled workers, as well as the time restriction regarding the time requirement for the execution of the work and the availability of skilled workers. The two incremental factors are estimated to be 150% each, i.e. they individually increase the minimum number of skilled workers by 50%, whereas their combination is 225%.

**Full-time employment of persons on a specific skill:** Estimates are based on the assumption that these skilled persons will practice on a full-time employment basis their acquired skill. However, given the small market size of Cyprus with regard to the above mentioned systems and services, as well as the small size of the labour market of Cyprus, which hinders further specialisation, it is expected that these people will be actually employed in conventional areas of their occupation and the practice of their new skills will be only a part of their work.

*Source: Cypriot national status quo report*
5.1.3. Estimates of number of workers by other characteristics

Estimates of number of workers by economic activity (NACE)

Only a few countries provided estimates of number of workers by economic activity based on NACE or national classification: Bulgaria, Poland and the Netherlands. The Netherlands provided workforce estimates by 2020 by economic activity. The Table below shows that by 2020 most workers, which are relevant to the BUILD UP Skills Initiative, will be needed in construction installation activities.

<table>
<thead>
<tr>
<th>Year</th>
<th>Civil &amp; Utility</th>
<th>Finishing buildings</th>
<th>Specialised tasks</th>
<th>Construction installation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>87</td>
<td>34</td>
<td>25</td>
<td>91</td>
</tr>
<tr>
<td>2013</td>
<td>86</td>
<td>33</td>
<td>25</td>
<td>90</td>
</tr>
<tr>
<td>2014</td>
<td>87</td>
<td>34</td>
<td>25</td>
<td>91</td>
</tr>
<tr>
<td>2015</td>
<td>87</td>
<td>34</td>
<td>25</td>
<td>91</td>
</tr>
<tr>
<td>2016</td>
<td>87</td>
<td>34</td>
<td>25</td>
<td>91</td>
</tr>
<tr>
<td>2017</td>
<td>88</td>
<td>34</td>
<td>25</td>
<td>91</td>
</tr>
<tr>
<td>2018</td>
<td>88</td>
<td>34</td>
<td>25</td>
<td>92</td>
</tr>
<tr>
<td>2019</td>
<td>89</td>
<td>34</td>
<td>26</td>
<td>93</td>
</tr>
<tr>
<td>2020</td>
<td>89</td>
<td>35</td>
<td>26</td>
<td>93</td>
</tr>
</tbody>
</table>

Source: Dutch national status quo report

Meanwhile Bulgaria and Poland provided some estimates particularly related to energy efficiency and the use of renewable energy sources areas. For Bulgaria the increase number of craftsmen needed is linked to the level of penetration of identified solutions in the building practice. Thus it provides assessments of perspectives of identified Energy efficiency and the use of renewable energy sources solutions based on the existing statistical data and expert opinions. These are provided in Annex 3.

In Poland in 2010 the total number of fitters of renewable energy sources installations (solar thermal energy, PV photovoltaic systems, agricultural biogas, heat pumps and small wind power plants) was approximately 3400. It is estimated that by 2020 the total number of employees in the fitter segment may amount to approximately 17,400. The greatest number of new job places related to the production of equipment, the assembly and the direct fitting of installation and service among all featured segments, may be generated by the solar thermal installation industry (more than 12,700) and the segment of biomass fired boilers, agricultural biogas and heat pumps (more than 1,000). The lowest market development and, therefore, the least amount of job places in 2020, have been forecasted for PV and small wind power plants.

Estimates of number of workers by qualification (ISCED)

A limited number of countries (e.g. Germany and Romania) provided workforce estimates by qualification so no overall conclusion can be drawn regarding the future qualification of workers. For instance, Germany emphasised that middle-level skills (i.e. ISCED levels 3b, 4) are the ones most needed in the building sector. The German status quo report shows that the absolute and relative change in workforce with middle-level skills is the highest by 2020 – 120 thousand and 0.56%. By contrast, high-level skills (ISCED levels 5a, 6) are least affected, with the relative change of only 0.3%. In Romania, it is estimated that by 2020 the number of medium qualified workers will remain the same, high qualified workers will increase from 125 thousand in 2011 to 147 thousand in 2020 and the number of low qualified workers will decrease from 145 to 139 thousand based on CEDEFOP forecasts.
5.2. Estimated training needs by 2020

Number of workers requiring training by 2020

The overview of national estimations of training needs by 2020 in the building sector, both quantitative and qualitative, reveals that current CVET provisions may be insufficient and that the training offer remains fragmented.

A large share of the existing workforce needs up-skilling to achieve the 2020 energy targets. According to the estimates available from the status quo reports or separately provided by countries in their country factsheets, the median (or the central value in a series) of the smallest and of the largest shares of building workforce requiring training was respectively 40% and 48%. Evidence shows that the need for training of the current workforce is much stronger than the estimated future labour demand.

The above figures should be considered as very approximate. The scope, level and intensity of training demand are complex and very difficult to estimate. It is adversely affected by a number of factors including sector-related and territorial fragmentation, sensitivities to price and the seasonal factor. The emigration of workers also affects these estimates—for example, due to the economic emigration of building workers, Poland increased its training needs estimate by about 10 thousand workers for the period 2012-2020. The estimation of training demand concerns not only predictable factors (e.g. EU Directive provisions), but also unpredictable national political decisions which formulate qualification requirements for the construction of buildings with high level of energy performance (incl. certification requirements). For instance in Greece the distinction between workers in need of further training and workers who are already trained, according to the educational needs proposed by the EU, is very complicated due to the underdeveloped accreditation structures with regard to energy efficiency activities in buildings and installing renewable energy systems.

Although the above figures are very approximate, they point to a significant need to train the current workforce. Figures reveal that the EU building sector mostly experiences skills gaps (i.e. vacancies filled/ jobs done with incomplete skills set) and not skills shortages (i.e. vacancies not filled/ jobs not done due to the lack of people with at least some knowledge, skills and competences). Data suggest that there is an urgent need to up-skill the existing workforce rather than re-train it.

Number of workers to be trained per year

A few countries provided estimates of the number of workers requiring training per year for 2013-2020. Such estimations require a good vision of future training schemes and an average time for training each workers bearing in mind some workers may be needing training more than once. In addition, factors such as territorial fragmentation, sensitivities to price and the seasonal factor complicate estimations. Slovenia estimates that during 2012-2020 the total training need will be 18600 workers and annual training need will rise from 2000 to 5770 workers per year (comprising over 27 thousand workers during this period). The Slovenian example shows that sum of annual training need of countries will be higher than total training need estimates provided in the Annex 4 due to the fact that same worker needs to up-skill more than once by 2020.

Occupations with the highest training needs

All national status quo reports have been screened to record occupations requiring additional training to achieve the 2020 energy targets. Occupations requiring additional training
emphasised in national status quo reports are provided for each country in Annex 5. In addition, Annex 6 also provides for each country occupations with the highest numbers of workers requiring additional training. Both Annexes should be considered as indicative and not as comprehensive and precise mapping of training needs in each occupation in each country. The Table below, based on above-mentioned Annexes, summarises most often emphasised occupations requiring additional training and those with the highest numbers of workers requiring additional training.

The Table shows that carpenters and joiners, bricklayers and stonemasons and building and related electricians are the most frequently mentioned occupations with an identified need for training. These professions are also the ones with the highest numbers of workers requiring additional training. Other occupations with identified training needs include plumbers, insulation workers, roofers and plasterers.

Furthermore, the occupations for which the number of workers identified as requiring training is the highest more or less correspond to occupations with the highest demand in the labour market (i.e. electricians/electrical equipment installers, carpenters/joiners, plumbers, RES installers, bricklayers and insulation workers). This shows that training needs by occupation usually coincide with groups of tradesmen with most people employed in the building sector.

<table>
<thead>
<tr>
<th>Table 4: Occupations with the most urgent training needs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Most often mentioned occupations requiring additional training (Annex 5)</strong></td>
</tr>
<tr>
<td>Bricklayers and stonemasons;</td>
</tr>
<tr>
<td>Carpenters and joiners;</td>
</tr>
<tr>
<td>Plumbers and pipe fitters;</td>
</tr>
<tr>
<td>Insulation workers;</td>
</tr>
<tr>
<td>Building and related electricians; and</td>
</tr>
<tr>
<td>Roofers.</td>
</tr>
<tr>
<td>Some less often mentioned occupations include:</td>
</tr>
<tr>
<td>Glaziers;</td>
</tr>
<tr>
<td>Concrete placers;</td>
</tr>
<tr>
<td>Concrete finishers and related workers;</td>
</tr>
<tr>
<td>Plasterers;</td>
</tr>
<tr>
<td>Floor layers and tile setters; and</td>
</tr>
<tr>
<td>Electrical mechanics and fitters.</td>
</tr>
</tbody>
</table>

Source: National status quo reports and information separately provided by countries

The occupations identified above are those with the most urgent training needs on average overall. However, training needs greatly vary between countries (e.g. Estonia stress the need of master-level employees, see below). Occupations for which additional training should be provided to meet 2020 energy targets are different in each of them. The Box below provides some examples of national training needs by occupation.

**Examples of national training needs on EE and RES by 2020 by occupation**

Due to the low level of introduction of low-energy building in **Bulgaria**, it is proposed that all workers should undergo short trainings on the basic principles of energy efficiency, preferably on the workplace. There is a clearly manifested shortage of installers for each of the investigated systems (small boilers, photovoltaic and solar heat systems, geothermal systems and heat pumps, mini wind turbines).

In **Belgium**, number of workers requiring training on EE and RES is the highest for bricklayers (6400 out of 33400 workers that require training), joiners (6400), roofers (2800), floor covering layers/tillers/plasterers (2500) and glaziers (2500).

**Czech** status quo report estimates that bricklayers, gypsum plaster board fitters (excl. wood), installer-heating engineers, carpenters and wooden structures fitters, joiners, masons (Thermal Insulation,
Plasters, Stucco Tiler (Stonemason) and assemblers of air and ventilation technology will experience a high degree of innovation and thus would lead to high demand for knowledge and skills by 2020. It is likely that these occupations will require training the most by 2020. Report also estimates that the highest education needs will be for workers with secondary level education with apprenticeship certificates. Twice as low education needs are expected for workers with university level education.

**Estonian** report stresses that within the framework of the BUS Initiative the most important training target group will be master-level employees (approx. 3,500), who are capable of instructing workers with lower qualifications and passing on professional knowledge and skills and are prepared to take responsibility for organisation of work, use of materials and work results. Roughly one employee with master-level competence is required per 6-10 construction workers. Master level competences are defined in the report as the skills of supervising construction workers with lower qualifications and of conveying professional skills and knowledge, and the readiness to take responsibility for organization of work, use of materials and outcome of work.

In **Greece**, the number of “blue-collar” building workers to be trained in each sub-sector/ profession to each skill level to achieve the 2020 energy targets has been calculated as follows (based on the ISCO-08 classification): 1) Building frame and related trades workers: from 36,000 (pessimistic scenario) to 86,000 (optimistic scenario); 2) Building finishers and related trades workers (it includes roofers, plasterers, glaziers, plumbers, air-conditioning technicians): from 73,500 (pessimistic scenario) to 98,500 (optimistic scenario); and 3) Electrical equipment installers and repairers: from 9,500 (pessimistic scenario) to 14,500 (optimistic scenario). Greece has also asked stakeholders, based on their experience, to identify occupations that they think deserve priority in training on RES and EE in the construction sector. Greece used tag cloud to visualise the answers with the following result:

![Tag Cloud](image)

**Hungary** asked company representatives to single out occupations in which professionals’ competence should be improved. First five occupations most often mentioned by companies were (in order of priority): stonemason, building insulation installer, central heating and piping fitter, fenestration installation technician and building engineer technician. Meanwhile asked the same question training providers singled out the following occupations: electrician, chimney mechanic, building insulation installer, air technology systems mechanic and central heating and piping fitter.

**Irish** report states that the highest training needs would be at craft level (main construction related trades - electrician/ carpenter/ joiner, plumber, bricklayer and plasterer; 49000 employees), less in Operative Level (10000) and the least in supervisory level (7230). Numbers of workers requiring training at craft level were the highest for carpenters/ joiners, plumbers and electricians.

**Italian** status quo report provides shares of workers of particular occupation that require training by 2020. The highest shares were for installers of insulation and soundproofing (86.8%), Installers fixtures and window frames (78.5%), electricians (70.7%), plumbers and heating experts (66.8%) and other building workers (67.4%).

In **Norway**, there are about 50,000 carpenters who shall all have knowledge about passive house and energy-efficient renovation over the next eight years. This means that an average of 6,000 to 7,000 carpenters a year must take part in training measures in the energy field. After carpenters, it is electricians (about 30,000) and plumbers (about 16,500) that are the groups of tradesmen with most people employed in the building and construction industry.
Poland assumes that out of a total of approx. 35,000 RES installers for whom training should be provided during 2014-2018 the specific need is as follows: installers of solar collectors: app. 1,820 people/year; installers of biomass fired boilers: app. 250 people/year, installers of photovoltaic power plants: app. 10 people/year; installers of heat pumps: app. 180 people/year; installers of small wind power plants: app. 35 people/year; and installers of agricultural biogas systems: app. 220 people/year.

Portugal emphasises that key occupations that not have a corresponding qualification include roofers, plasterers, insulation workers, glaziers and pipe fitters.

Sweden estimates that out of approx. 100,000 skilled workers within the construction industry to be trained to achieve the 2020 goals specific needs will be the following: 32,200 construction woodworkers etc., 23,650 installation electricians and electrical fitters, 13,500 plumbing and HVAC contractors, 8,500 ventilation installers, 8,000 bricklayers, 4,700 cooling technicians, 4,200 concrete workers, 2,000 roof fitters, 1,500 insulation fitters, 1,500 glaziers, 1,200 other construction tradesmen, 300 steel construction fitters and sheet iron fitters. Building site management will also need to undergo further training and this amounts to 15,000 technicians/engineers.

The highest British estimated numbers in the blue collar workforce requiring training to help meet 2020 energy efficiency targets include plumbers and heating and ventilation engineers (52,000), electricians and electrical fitters (39,000), carpenters and joiners (28,000), construction operatives (23,000) and glaziers, window fabricators and fitters (12,700).

Source: National status quo reports

The estimation of training needs was not only on quantitative, but also qualitative. The Box below provides some examples of qualitative estimations of the training needs of existing employees derived from surveys, interviews or other research methods. They support the finding that the current CVET provision with respect to EE and RES in building sector is not sufficient and needs to be strengthened.

Examples of qualitative estimations of the need for training for existing employees

The Estonian report estimates that construction workers who lack professional training account for close to 50 % of workers at construction companies. The statistics show that this percentage decreases during times of economic recession and rises as the economy grows. It is much harder to broaden the knowledge of untrained workers in the field of energy efficiency than it is in the case of those with specialty training. In addition, this group is characterised by very high turnover and high share of seasonal workers. There is a danger that the sector will continue to have a significant number of workers who lack the necessary know-how.

In Spain, looking at the relationship between job roles and the training of workers in those roles, workers believe that this training is correct in 85% of cases. Over-qualification of workers in job roles occurs in 10.6% of cases, while under-qualification (1.4%) or the need to undergo a different type of training from that already possessed (3%) make up a total of 4.4% of employees who need to update their training to adapt to the requirement of their job roles, a situation which is slightly greater than that in the economy as a whole, 3.8%.

Survey of BUS project stakeholders in Greece showed that around 45% and 40% of stakeholders respectively indicated that the extent to which the qualifications of the existing craftsmen in the building sector meet the needs of the market is partly satisfactory and slightly satisfactory. More than 10% of them answered that it is not at all satisfactory. Answers to the question ‘Do you think sufficient opportunities specialised technical training on EE and RES for technicians currently employed in the building industry?’ were similar – over 40% answered partly or slightly satisfactory and around 15% not at all satisfactory.

In Spain, of all of the employees in the sector, the percentage of workers which experts consider could be linked to energy efficiency and the use of renewable energy varies - in the best of cases - between 25 and 35%, though this proportion may increase in the future if there is sufficient funding and monitoring to ensure compliance with regulations. However, to comply with the regulatory requirements and specifically the 2020 objectives, 100% of workers involved in energy renovation, as in new works, will require extra knowledge on the subject, even if it does not need to be a lot.
In Latvia, almost all 16 surveyed company representatives admitted that their workers’ should receive training to improve their qualifications. This means that the improvement of qualifications with the help of training methods is appreciated. Only one respondent admitted that it is not necessary because all skills can be acquired in practice.

In Lithuania, according to surveyed companies’ answers the number of company workers who are prepared for the construction of energy-efficient buildings was about 40%. The assumption made that additional learning is required for about 60% of the construction company workers in the target group. The number of company workers prepared excellent and well for the use of renewable energy source technologies was about 30%. The assumption made that additional learning is required for about 70% of the construction company blue-collar workers in the target group. Occupations in Lithuania are not strictly divided into EE and RES groups. Thus to predict the need for additional training report summarises the results for both groups. Following this report assumes that additional training should have an average of 50% of the workers.

Romanian report stressed that the share of staff without specific expertise in construction was worryingly high and relatively constant over the period 2008-2011: 30.25% in 2008, 32.14% in 2009, 32.47% in 2010 and 32.04% in 2011.

In Slovakia, survey of employers, based on experience with the existing quality of the work, suggested that an average 31% of their employees and 43% of its employee’s subcontractors will need additional training.

British national status quo report identifies employer perspectives on the percentage of their permanent or sub-contracted workforce that will require additional training in order to achieve the 2020 targets. Nearly 50% of respondents consider that up to 10% of their permanent workforce will need extra training to up-skill; however nearly 30% consider that between 76 and 100% of their workforce will need to be trained. The feedback shows that there is little difference between anticipated up-skilling needs for the permanent and sub-contracted workforces.

Source: National status quo reports

Companies’ strategies to deal with shortage of qualified workers
Companies adopt different measures to deal with shortage of qualified workers. For example, 64.5% of surveyed Estonian companies were very willing to raise qualification of existing employees, 47.5% - to invest into equipment for raising labour productivity, 46.7% - to create contacts with future employees while they are still in school and recruiting workforce from schools and 41.5% - to launch employee search on job market. Few companies answered ‘yes, definitely’ in respect of implementation of overtime for existing employees (8.9%), poaching employees from other companies (8.8%) and using foreign labour (7.3%). Although most companies are willing to train their existing workers, they usually adopt highly selective approaches for this. For example Estonian report showed that companies’ readiness to refer construction workers to training in the field of EE in the years ahead is much lower (53% of companies that responded) than the wish to refer engineering and technical personnel to such training (83% of respondents).

The above suggests for the need to stimulate the demand among companies and change their expectations with regard to external training. For example survey in Lithuania showed that not all construction companies fully understand the importance of workers qualifications, as well as do not trust the external training and value more work practice on construction site.

According to Polish status quo report, construction companies do not have high requirements related to formal qualification of blue-collar workers since the performed work is considered relatively simple. To master the tasks short work-based training usually proves sufficient. The effects of training are expected immediately. The key problem is to find and maintain trained workers employees at work. Fluctuation on these workers is rather high due to various reasons including to low wages, tension related to the work conditions or the seasonal aspect of the work. Therefore employers usually look for employees with experience in the
industry and in this way limit the needs for training. Meanwhile companies place particular importance for the creation and development of a strong and stable supervisory staff which will be able to cope with a diversity of challenges. Companies apply the rule of a gradual increase of duties and skills of persons beginning in an occupation. Engineering staff is provided training preparing them to independently deal with their tasks. The method of training and promotion aims at stabilising the company’s own supervisory staff. Only in the case of atypical projects building companies are forced to search for highly qualified specialists from outside.

Furthermore, some types of external training courses prove too expensive for companies, especially those for which require the use of expensive and real equipment and materials. Thus companies often choose work-based learning where trainee is supervised by a mentor (experienced employee).

The above-outlined factors suggest that companies tend to provide suboptimal level of training for their blue-collar staff. This is especially relevant for SMES which have very limited resources for training and also for subcontractors which quality of work is often the weakest link in the chain. It is thus important to stimulate the training of on-site building workers not only by addressing the most relevant skill needs in the labour market, but also by ensuring adequate supply of CVET courses and implementing other measures such as financial incentives for companies or training innovations.

5.3. Skill needs

Although some new occupations are emerging, the most significant change expected in the sector is the transformation of existing occupations and related skills sets. It overviews emerging knowledge and requirements both general which are relevant across occupations and specific with examples covering occupations most frequently quoted as requiring training. Finally, this section concludes by stressing the importance of transferable, cross-trade knowledge and skills.

New occupations

Increasing regulatory requirements, emerging new technologies and solutions, changing work patterns related to energy efficiency and the use of renewable energy and challenges in meeting 2020 energy efficiency targets may the need for new occupations. Examples of ‘new’ occupations are outlined in the Box below.

Examples of ‘new’ occupations in EE and RES fields

| The Irish report argues that within building energy management field the introduction of sophisticated control equipment within a domestic situation (which includes building energy management systems (BEMS), energy management, fire/intruder as well as video/audio) may require a new type of technician for market, design, installation and maintenance. |

According to the Romanian report, the following occupations are not yet included in Classification of Occupations: installer of small boilers using biomass; installer of heat pumps; and installer of geothermal systems, while the occupations installer of solar photovoltaic systems and installer of solar thermal systems have been already introduced in Classification, but their occupational standards are not yet elaborated.

The Netherlands also pointed out to some potentially missing professions, i.e. a number of specialisations are not easily linked to an existing professional competency profile. Particular importance is given for specialisations in the fields of insulation and prefab elements. In the list of construction professions derived from professional competency profiles, the profession of insulation specialist or retrofitter of insulation does not appear. The same could be said about profession of fitter and installer of prefab parts.

Poland signals of the appearance of a new occupation in the occupation classification – technician of
renewable energy equipment and systems. This occupation comprises the qualifications of installation and operation which, in turn, include the education effects (skills and knowledge) of: installation/operation of biomass-fired boilers, installation/operation solar collectors, installation/operation of heat pumps, and installation/operation of small wind power plants.

In Portugal gas technician and wind systems installer do not explicitly have a corresponding occupation, but are included within some other occupations.

British national status quo report indicates the need for creating some new occupations that would be necessary in order to meet with the 2020 energy targets. Potential new occupations related to EE and RE in the construction sector are the following: energy inspectors; solar panel installers; energy efficiency officers; solar energy engineers; renewable energy engineer; low carbon site manager; and low carbon consultant.

Whether ‘occupation’ can be considered as ‘new’ very much depends on the context. The Box above illustrates that in Portugal wind systems installer is not considered a formal occupation, but a part of other occupation, while in Denmark or Germany this occupation exists for some time already.

Transforming existing occupations
Research argues that major change concerning skills needs we are witnessing today is not emerging new occupations, but transformation of existing occupations. The latter are significantly affected by technological innovation processes that enrich the work activities with new meanings and new contents, demanding the continuous adaptation of the existing skills sets, and thus favouring the spread of requirements increasingly redefining knowledge and practices. This change is illustrated in Bulgarian report which argues that although there exists opportunity for business to propose new professions in the List of professions for VET, it is not reckoned necessary to introduce these new professions related to implementation of measures for energy efficiency improvement and the use of renewable energy in buildings. However newly emerging solutions such as higher insulation standards, triple glazing, PV (rooftop and facade) and biomass CHP or trigeneration, etc. require additional qualification of craftsmen working in the different subject fields and/or significant upgrade of their skills. The British report also suggests that the majority of arising skills needs is in fact for up-skilling as opposed to developing new, specialist skills. For example research revealed that roofers need to install solar panels and therefore also require some electrical and IT knowledge.

Transformation of the existing skills sets is taking place in most if not all building sector occupations. This transformation is especially important to address for occupations with large shares of building workforce. The Box below provides examples of the emerging knowledge, skills and competences needs for some most important occupations requiring additional training to meet the 2020 energy targets.

Examples of skills and knowledge needs for some of most important occupations requiring additional training to meet the 2020 energy targets

The Norwegian report provides a number of examples of competence goals in the energy field for those performing the work. For example, the competence goals for carpenters include:

- Securing against damp: Knowing what materials and components are sensitive to damp, what additional requirements this sets for construction and how to secure structures against damp during the building period; Awareness of methods for drying out, dehumidifying and damp measurement; Knowing that damp in the insulation increases heat loss and increases the risk of mould and rot; Knowing the difference between damp proofing, damp braking and wind proofing as regards damp resistance properties; Knowing how a window shall be secured against damp intrusion and that the risk of damp intrusion is greatly increased when the window is placed further into the wall;

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See, for example, Eurofound (2013).
• Heat loss (insulation, thermal bridges and air tightness): Knowing how to perform sealing for the most important detail solutions; Knowing that insulation shall be carefully tailored so as to achieve the planned U value, i.e. that all irregularities must be completely filled and compression avoided; Knowing which materials in building solutions create thermal bridges; Being familiar with the most important detail solutions for breaking thermal bridges and achieving low thermal bridge values, especially around windows, around foundations, on the front edge of decks, in corners and in the transition between floor and wall and wall and ceiling;

• Jobs in existing buildings: Knowing how to select robust and secure solutions for post insulation of building parts and structures; Knowing that exterior insulation involves an increased risk of damp intrusion around windows (especially the bottom edge) because windows are then further into the wall; Knowing that post insulation makes a damp proof layer more important; Knowing about possible consequences of interior post insulation when there is an outer cladding of brickwork, plaster or concrete; Knowing about measures to improve air seals and reduce air leakage and that sealing jobs in existing buildings must be assessed against ventilation needs.

The Spanish status quo report identified the following emergent skills for electricians:
• Apply manual regulation and control systems, as well as time delay or detection systems in areas used less often to favour conditions in which energy consumption is reduced.
• Select elements which comply with specific regulations with each type of material in order to improve energy efficiency.
• Verify that the lighting installed limits the losses of its auxiliary equipment so that the total power of the equipment and lighting is below the limits set.
• Verify that the Installation Energy Efficiency Value (VEEI) is below the limits established to optimise the total power of the illumination parameters which define the quality and comfort of the level of lighting.
• Define and carry out preventive maintenance and monitoring on the installation, including all necessary operations to ensure its correct functioning and compliance with the minimum lifespan expectations. Carry out frequency and maintenance operations on each component of the photovoltaic installation.
• In the case of installations connected to the network, guarantee the correct application of the technical conditions from Royal Decree 1663/2000 as well as all aspects applicable to legislation in force.
• Set the operations which allow for evaluation of the photovoltaic installation's operational parameters to ensure its correct operation.
• Check that the groups of lighting and equipment have the manufacturer's certificate to accredit the power of the whole and favour the reduction of electrical consumption.
• Check the existence of a lighting installations maintenance plan to guarantee the suitable engineering parameters and energy efficiency of the installation.
• Carry out the electrical lighting installation in agreement with the project for correct illumination of the building suitable for normal use.
• Complete the lighting engineering calculations.
• Determine losses due to inclination, orientation and shadows in the collection system to ensure the installation is correctly dimensioned.
• Verify that the level of dazzling from interior lighting installations be adjusted to the lighting parameters which define the quality and comfort of the lighting level.
• Carry out the electrical installation of emergency lighting to guarantee a minimum level of lighting in the case of emergency evacuation of the building.
• Carry out the installation of grounding as per the project to limit the risk of damage due to lightning.
• Carry out the installation of a lightning conductor to limit the risk of damage due to lightning.

The Swedish report stresses that in addition to the basic knowledge of energy-efficient buildings, more in-depth expertise needs to interact with the various fields of operation including:
• Bricklayers' knowledge on, detailed solutions for airtight constructions, how moisture damage can be avoided, different types of well-insulated, heavy climate shells, as there are many alternatives and several that are being developed, for example, for additional insulation of existing buildings' climate shells;
• Roofers' knowledge of different types of well-insulated, light climate shells with high airtightness
requirements:
- **Insulation workers’** knowledge of different old and new insulation materials, as well as how they are integrated in climate shells with high airtightness requirements;
- Installation **electricians** and fitters’ knowledge on advanced ventilation aggregates, heating systems, heat recovery systems, lighting systems and therein relevant control and monitoring systems, particularly a development of lighting and building automation systems are taking place.

However requirements for additional knowledge, skills and competences emerge not only within each specific occupation, but also across the industry. For example Norway summarises the competence goals for what various executing professionals in the building industry must know so as to: (a) erect new buildings to passive/near-zero energy levels; (b) renovate existing buildings to a very high energy standard; and (c) install renewable heating and cooling systems in both new and existing buildings. These goals demand for additional cross-trades knowledge, skills and competences of blue-collar workers. It should be transferred to all employees without exception. In this way the risk of compromised performance of new building solutions and techniques may be minimised.

Furthermore, to gain and/ or strengthen additional knowledge, skills and competences related to energy-efficient buildings and technologies of renewable energy sources workers need to have strong ‘foundation to build on’. This ‘foundation’ relates to transferable skills such as leadership, learn to learn, project management, foreign languages and others.

Examples and importance of transferable and cross-trade knowledge and skills are discussed in the box below.

**Importance and examples of transferable, cross-trade knowledge and skills**

The **Austrian** status quo report emphasises the importance of cross-trades knowledge. It argues that especially in the construction of nearly-zero energy buildings there is a lack of knowledge, beyond the own expert knowledge. This results in failures concerning proper installation of insulation, dealing with vapour barriers, installation of windows, etc. Thus cross-trades knowledge is required which is can be built by further trainings. Training, where speakers and colleagues form different trades bring in their experiences, enables a positive exchange of knowledge, which in turn creates a synergy effect.

According to the **Finnish** report, basic skills are important for all building occupations. Special importance is given for skills related to control of the overall entity - employees must be able to grasp the importance of their own work as part of the overall entity. The same applies to the work supervision level that must also be included in all energy efficiency training. Energy efficiency must also be viewed within the context of a broader overall entity of environmental impacts.

The anticipated demand for knowledge and skills of blue-collar workers related to energy-efficient buildings and technologies of renewable energy sources in **Lithuania** include: knowledge in envelope tightening technology solutions; new materials and products of envelope tightening; requirements for work quality, quality control envelope tightening; fundamental knowledge in thermal physics, heat and moisture transfer techniques in different environments; knowledge of tightening, ventilation and air-quality requirements in buildings; knowledge of efficient use of energy and energy consumption reduction measures and priorities; knowledge of mutual compatibility of new materials and technologies. 2020 energy targets also demand for particular skills: ability to work with a new material; ability to work with new equipment; ability to use new technologies; ability to perform proper sealing of joints between structure elements of envelope and engineering equipment; ability to use the envelope sealing material or product; ability to perform the quality control of partitioning tightness.

It is noteworthy that all site workers in **Ireland** are required to complete ‘Safe Pass’ training course covering health and safety in construction. The Safe Pass programme was launched in 2000 with the objective of ensuring that “over the course of time, all workers in construction will have a basic knowledge of health and safety, and be able to work on-site without being a risk to themselves or others who might be affected by their acts or omissions”. All onsite workers are required by law to hold a valid Safe Pass registration card, the renewal of which is dependent on the holder updating their
Transferable skills are especially relevant for workers in SMEs. As revealed in Polish status quo report multi-skilled employees with strong transferable skills are sought in SMEs and this is related to their experience. Companies of this type usually “transfer” employees from one 

Source: National status quo reports
task to another. Therefore, the employee needs to be sufficiently adapted to work in the profession to be able to quickly shift from one type of work to another. Meanwhile the larger the company, the stronger is its specialisation. An employee in large companies is responsible for the entrusted work scope. In this case, the preference is towards young employees who are eager to learn.

Increasing mobility of EU building workforce deserves a special attention, especially in some countries with very high shares of foreign workers (e.g. Finland or Luxembourg which claims that approx. 90% of all workers come from abroad, day to day or based permanently). Foreign workforce is often unqualified or with difficultly verifiable qualifications. This creates the need for countries to find ways to further educate foreign workers. One difficulty is to motivate employers to arrange training and foreign workers – to train. Another is lack of teaching materials in different languages, which at least cover the basics. However foreign workers also need to learn foreign languages as drawings, installation instructions, and other similar materials in different languages are rarely found on construction sites. Large share of foreign workers with no adequate up-skilling opportunities and incentives provided may result in increasing building failures. However each country needs to find its own way outs of these and other problems. The experience shared in the BUS Initiative provides good platform for this.

5.4. Qualification needs

This section provides concise overview of qualification needs identified in national BUS projects including qualification courses and schemes required for energy efficiency improvement and the use of renewable energy in buildings, training and accreditation structures for carrying out these courses, number and qualification needs of trainers, training cost estimations and improvements needed in the existing monitoring systems to prevent skills gaps in the sector.

5.4.1. Required qualification courses and schemes

The earlier section suggested occupations and areas where new or upgraded existing courses and schemes may be needed in order to meet the 2020 energy targets. Due to significant differences in qualification needs across countries section will not summarise, but rather provide some examples of new and/or to be upgraded courses and schemes in the building sector.

The starting position of countries is very different. For example in Germany comparison of the gaps existing at the end of an apprenticeship with the CVET programmes available on the CVET market, showed that these gaps can in principle be closed. This suggests that the need for new or improved existing courses and schemes in Germany may be lower compared to other countries. Contrasting example is Sweden where, despite the fact that this country has highly favourable conditions for adult learning, national education of skilled workers does not include mandatory elements of energy-efficient building. There are only a few general energy formulations in the qualitative targets, which is not sufficient. Thus, the need to provide new and/or improve existing CVET courses and schemes in these countries may be significantly higher than in Germany. This rough comparison of different starting positions of countries is further exemplified in the Box below outlining some concrete national examples in this respect.

Examples of country needs for new and/or upgraded existing courses and schemes

In Austria the following topics must be reinforced in further trainings (upgrade of existing programmes is necessary): replacement and installation of windows; ventilation systems; executive tasks in passive and low energy houses; specialists for new heating and heat pump technologies; fitting of thermal insulation; thermal facade refurbishment; prevention of structural damage incl. planning, material and
performance errors; and cross-trades knowledge.

According to the Bulgarian report introduction of new training programmes and/or upgrading of the currently used ones is necessary as a matter of priority in the following directions: high insulation standard (< 0.18 W/m²K); balanced ventilation with heat recovery (>80%); triple glazing; biomass CHP or tri-generation; automatic lighting controls; automatic controlled external shading; solar thermal for domestic hot water, solar cooling systems brine/water heat pumps, water/water heat pumps, air/water heat pumps pellet boiler; balanced ventilation with heat recovery (>80%); LED lighting; automatic lighting controls; gas boiler, oil boiler; air handling units and filters; cooling/air conditioning systems; radiators; PV installation in buildings; under-floor heating system; window installers.

Estonia argues that occupational standards should direct both formal education and in-service training to treating the following topics: organisation of construction work; typical faults in construction work and their causes; primary manifestations of construction faults and the thermal physical impact on structures and buildings' energy efficiency; and how the selection of construction work technologies influences the environment and the energy expenditure of the construction process.

In Finland qualification needs are spotted in the following themes: control of overall entity; heat insulation and airtightness; moisture control; HPACS installations; RES installations; basic skills; renovation construction; co-operation between the sector’s different operators; and foreign workforce’s training needs.

Ireland identifies the following areas where there is a potential need for development of new training programmes: non-domestic heating technologies; eco-construction and retrofit; heating controls and system efficiency; energy efficient construction technologies; energy efficiency / energy and carbon management.

Lithuania, based on a survey, lists planned training programmes related to the construction of energy-efficient buildings and renewable energy technologies. Newly created programmes related to the construction of energy-efficient buildings include company driven courses such as Cembrit new products and building thermal insulator. An upgrade of existing training programmes is also foreseen, for instance linked to passive houses or roofers training program and training programme of building thermal insulator. Newly created programmes related to renewable energy technologies include: the development of photovoltaic energy, use of renewable energy sources in the renewal of apartment blocks and engineer of energy-efficient buildings. Planned to be upgraded programmes in this area were: heating and cooling of the building surfaces (floors, walls, ceilings) and installer of building engineering equipment.

Skills and knowledge scoring combined with industry stakeholder views in the UK national status quo report suggest that the following aspects need to be addressed via development or enhancement of qualifications for the blue collar built environment workforce: understanding the principles of heat loss; understanding air quality, air tightness and ventilation requirements within buildings; knowledge of the range of energy efficiency measures, and their suitability for different building fabrics and ages, including pre-1919 stock and hard to treat buildings; the so-called ‘hierarchy’ of energy efficiency measures, i.e. the sequence in which issues in buildings must be addressed in order to ensure maximum energy efficiency; installation of ground and air source heat pumps; installation of solar thermal and solar PV; installation of energy recovery, energy efficient cooling and shallow geothermal systems; installation of biomass, combined heat and power and wind turbines. In addition further specialist units in the following areas will be required to be added to existing qualifications in order to meet the 2020 targets: Energy consumption; The 2020 targets and what they mean for the building sector; Legislation relating to energy efficiency (as it continues to emerge) and what this means for the building sector; Quality assurance specifically in relation to energy efficiency materials, measures and procedures.

Source: National status quo reports

Different courses are needed for different qualification levels. For example, Ireland overviews its training requirements cross three occupational levels:

- Operative level which covers skills outside the formal building trades education/ skills structure and includes general operatives, concrete workers, steel workers, roofers
and glaziers, all of which contribute to the construction/renovation of the building fabric;

- Craft Level where a formal craft apprenticeship or equivalent training has been successfully completed (most of qualification needs are concentrated at this occupation level); and
- Supervisory level at a specialist, supervisory or project manager position where a craft worker has progressed to roles such as system installation specialist, site supervisor, small/medium sized building contractor or equivalent.

Requirements for courses and schemes and their content are very different across these levels or other characteristics such as groups of learners (e.g. planners, workers, controllers, enablers, suppliers, clients, etc.). Overview of these differences is out of the scope of this report.

The Dutch national status quo report suggests that ensuring development of new or upgrade of existing schemes is not sufficient and requires strong management at the system level. Report argues that when a need arises for a certain course or training, it is not always clear whether it exists or is being developed. Especially this is true for emerging technologies such as green facades or sustainable lighting for which the number of courses currently available is limited. For technologies which have already been introduced on the market, the supply is larger. The quality of what is on offer is very diverse and a standardised accreditation system is lacking. These circumstances make it difficult for workers to choose the right courses and schemes. They also complicate the process of development of new schemes and result in duplications or other coordination problems. Thus this raises the need for adequate training and accreditation structures supported by accompanying measures such as active guidance for workers in updating their qualifications.

5.4.2. Training and accreditation structures for carrying out the trainings

The 2020 energy targets pose substantial challenge for currently existing national training and accreditation structures. There are only few countries (e.g. Austria, Belgium, Finland, Germany and the Netherlands) where training and accreditation structures are relatively well-developed or need some less substantial changes. For example Austria emphasises only the need specialisation of training providers in the area of EE and RES. Germany calls for optimising existing CVET programmes through their registration and standardisation as well as creating a database of programmes with central administration and appropriate communication at regional level for more transparency and to motivate SMEs to carry out staff development. Other countries with relatively well-developed structures stress the need to update, refine and/or expand their existing vocational profiles (Belgium), professional competency profiles (the Netherlands) or accredited qualifications based on National Occupational Standards (the United Kingdom) to ensure that due attention is paid during trainings to knowledge and skills which are relevant for the realisation of energy efficient and sustainable buildings. Meanwhile Finland argues for the expansion of theoretical studies, more active supervision of the quality of on-the-job learning and co-operation among the various parties to accelerating changes in the system.

However, training and accreditation structures are not satisfactory for most countries for which the data is available. Overview showed that training and accreditation structures in respect of EE and RES in buildings are underdeveloped not only in countries with moderately favourable conditions for adult learning (e.g. EE, CZ, SI) or those with less favourable conditions (e.g. BG, CY, EL, HU, LT, PL), but even in countries with highly favourable conditions for adult learning. For example Norway highlighted that there is no national system or offer of systematic training for craft or journeyman's certificates and no official approval, accreditation or certification of courses offered or any national goals for content, quality or evaluation and thus training and accreditation structures have to be created.
Sweden emphasises that CVET development initiatives need to be created in order to provide a general and broad knowledge base in the building of energy-efficient buildings and low-energy renovations, as well as renewable energy sources and systems and capacity of training providers needs to be multiplied to ensure the training content.

Overview shows that training and accreditation structures have to be strengthened in most if not all countries, even in those which in general have highly favourable conditions for CVET. Examples of country needs for training and accreditation structures are illustrated below (not exhaustive list):

- better management of CVET system (e.g. registration and standardisation of CVET programmes (DE); registration of training providers (PL));
- reforming the training content (e.g. update, refinement and/or expansion of existing vocational profiles/qualifications/training plans and programmes (BG, BE, EL, NL, UK); strengthening of the interdisciplinary approach in training (SI); expansion of theoretical studies (FI); addressing overlap between teaching materials, disproportionate distribution of contact hours among curricular parts (HU); need for new curricula (EL, LT); emphasis on practical skills (PL); enriching the topics of programmes to meet the long-term skills needs of the labour market (CY); speed up the process of updating and generating new qualifications and skills (ES));
- reforming training methods (e.g. introduction of new practical forms of training such as on-site training based on concrete examples, short-term, but continual, free of charge for own workforce (SI); complementary set-up of informal training formats based on good training practice as supporting tools for other/existing education and training practices (SI); aligning timing of further training with the seasonal burden of professionals (HU));
- increased capacity of existing training providers (e.g. specialisation of training providers in the area of EE and RES (AT); more in-service training for instructors to catch-up with recent developments (HU); more training experience and practical skills of training providers (LT));
- improvement of certification systems (e.g. a certification system to evaluate informal training (SI); development of internal branch certificates as an instrument for achieving better transparency of competences’ proving procedures of nZEB workers (SI); certification/accreditation procedure of new qualifications which is compatible with the existing system (EL); need for national certification system (LT));
- developing quality control, accreditation systems (e.g. set up of an integral quality assurance system for nZEB construction (SI); supervision of the quality of on-the-job learning (FI));
- more adequate facilities, equipment and materials for training (e.g. scarcity of up-to-date technical books, teaching materials, educational DVDs and CDs (HU); lack of teaching materials (LT); upgrade of the existing training infrastructure and the creation of new vocational training centres (CY, EL); lack of widespread availability of purpose built rooms for practical demonstration of building fabric technologies (IE));
- less regional asymmetries in training provision (e.g. reduction of considerable spatial dispersion of CVET (CZ); uniform distribution of new education centres (EL); reduction of over centralisation of training in Budapest and increase in a number of training places (HU));
- closer links between world of education and training and that of work, cooperation of training providers (e.g. active involvement of construction industry in the training process by executing acknowledged training programmes (SI, FI)); cooperation between training providers to develop comprehensive training programmes incl. help from companies in dealing with specific topics (EE); cooperation between bodies that award qualifications and training providers to ensure closer linkage between studies and qualification requirements (EE));
• more initiatives and incentives to strengthen training and accreditation systems (e.g. incentive mechanisms (reliefs, discounts) to increase number of internships at companies (EL, PL));
• increasing attractiveness of VET, increasing participation in VET (e.g. introduction of remedial programmes (EL), placing more emphasis on work-based learning (HU); addressing disincentives including long training programmes and very few opportunities to have non-formal/informal learning and work experience recognised (HU); promotion of construction occupations (PL)).

Importantly development of training and accreditation structures for carrying out of trainings is complex process and few compromises need to be made during it. For example, one advantage of using accreditation or certification is the greater guarantee of the quality of courses being implemented. This is especially important for, for example, subcontractors which perform part of works or self-employed who need to prove their capacity in the market. Furthermore, as Spain argues, in the sector, where many unqualified workers are employed, accreditation for training gained through professional experience favours the reintroduction of unqualified workers who did not complete their school studies. In this sense, certificates of professional standards satisfy the needs of the sector since they have greater flexibility and do not require any former qualifications to be accessed. However a disadvantage of comprehensive accreditation or certification, as stressed by Norway, may be that this would probably increase the cost of participation in training, which could lower participation. In rural areas with fewer workers to form a customer base for courses, there may be a risk that the expenses of accreditation, certification or the like will make costs too high to make it interesting for private course organisers to initiate training courses.

Another possible trade-off concerning training structures is identified by Finland which argues that training aimed at the enhancement of energy skills, which should be of high quality and short-term, is also the source of an unresolved conflict. The subject matter may be so difficult that short-term training is not enough to achieve a good learning result. Employers often lack the resources, or are unwilling to let employees enrol in long-term courses because time is money. According to Finland, companies should be given incentives to enhance their employees’ skills, as well as guarantees for their benefits. However this type of measure may not be feasible in countries with very limited national education budgets. Another option would be to stimulate training and other innovations such as flexible on-site training (see bullet points above) or apps determining skills needs of workers which may minimise productivity losses for the company and increase their demand for training.

There is no single all-purpose recipe for the improvement of training and accreditation structures and solving above-identified and other conflicts related to this process. Each country is challenged to resolve the related to training and accreditation in the light of its national context and available remedies. 2020 targets related to EE and RES provided unique opportunity to improve image of the building sector in Europe and strengthen its supply base. An evidenced-based education and training policy, based on system-level approach and considering all possible effects of training, accreditation and other initiatives, could make a maximum possible use of this opportunity. Key success elements of this policy is sufficient number of qualified trainers to address the training needs, adequate funding and advanced monitoring structures – all of which are addressed in sub-sections below.

5.4.3. Number of required trainers

Most national status quo reports provide very abstract and scarce information on the estimated number of trainers needed by 2020 with varying level of detail and scope. Although countries seem to have rather different visions and needs in respect of the number of trainers, the available information in the Box below signals the emerging trend that some
Speciality trainers (e.g. insulators, plumbers, electricians, masons, carpenters and heating experts) are needed in most EU countries.

**Examples of national estimations of trainers by 2020**

Some national status quo reports identify an issue of **shortage of well-trained trainers or training of trainers in the specific fields**, however not providing any specific figures. For example, it is stated that Bulgaria will lack well-trained trainers in civil engineering professions and practical classes. The **main reasons** are that the teaching profession is unattractive for young graduates and that a significant number of the present teachers will retire in the next years. Hungary also faces the same problem: a lack of skills and competencies in state-of-the-art technologies. Moreover, Hungary needs more training of trainers rather than preparation of new trainers. The Netherlands identifies unspecified number of trainers needed mostly in the following construction of buildings occupations: building construction labourers, carpenters and joiners, insulation workers, roofing specialists, painters and glazers, plasterers, building and related electricians, technical testing and analysis specialists, plumbers, heat and air conditioning installation specialists.

A need to train trainers in the specific fields could be identified in several reports. For example in case of Bulgaria a number of teacher trained until 2020 period should be at least 1000 trainers educated in practice and theory for all classic construction works, energy efficiency, and installers.

Some countries estimate **pessimistic and optimistic scenarios** for preparing the trainers. By 2020 Spain forecasts a need of trainers from 1063 (pessimistic scenario) to 2685 (optimistic scenario), Romania identifies a need of trainers from 245 to 628, United Kingdom forecasts a need of 500-700 trainers, and Slovakia estimates these numbers at 40 to 60 correspondingly.

Moreover, some of the countries calculate more specific needs of **speciality trainers**. For example, by 2020 Romania estimates a need of the following training suppliers: insulators (thermal insulation, rainproof insulation) (from 156 to 356), plumbers (from 77 to 166) or window system assemblers and installers (from 3 to 34) or construction electricians (from 0 to 48). Slovenia calculates totally a yearly need of 250-273 trainers**: construction trainers - 209, system installer trainers - 38 and PV installer trainers - 26. Italy needs a total of 1338 trainers, of which 1139 would be specialised trainers and 234 - generic trainers. More specifically, in Italy the following trainers were identified as most needed: masons - 484, electricians - 280, unqualified construction personnel - 234, plumbers and heating experts - 149 and carpenters - 128.

Other countries calculate only the **overall demand for trainers** by 2020. For example, Greece estimates a need of 1900 trainers in the entire period to 2020, Poland - 1400 trainers (or appr.175 trainers/year), Ireland - at least 700 trainers (or at least 100 trainers/year), Sweden - at least 500 trainers to train low-energy skilled workers. In addition, approximately 1500 teachers of skilled workers will receive continuing profession training in Sweden. By 2020 period smaller countries calculate lower demand for trainers: Belgium and former Yugoslav Republic of Macedonia - 300, Croatia - 150, Estonia - 70.

* AT, CY, CZ, DE, DK, FI, FR, LT, LU, LV, MT, NL, NO and PT do not provide estimates of the number of trainers by 2020.

** Slovenia provides calculations for the period of 2011-2016.

Source: National status quo reports.

Estimation of number of trainers proves complex considering that in some countries (e.g. Spain or Norway) there is no prior definition of the skills required in the energy efficiency in buildings subject or the trainers' requirements and there is no evaluation system which guarantees the quality and suitability of the existing trainers. Thus comprehensive appraisal of the current capacity combined with clearer qualification requirement and increased qualification of existing trainers may significantly reduce the need for additional number of trainers by 2020.

At least half of national status quo reports emphasise the need to train the existing trainers. Reports single out a number of issues regarding the current situation with trainers: ageing of trainers (BG, LV, NL); their low remuneration level (BG) combined with increased requirements and workload (LV); lack of systematic (e.g. with clear skill requirements) and well-coordinated response to the general need for up-skilling of trainers (BG, ES, FI, IE).
which is further exacerbated by the pace of changes to building regulations for energy performance and the fact that many of existing trainers do not have experience of on-site implementation of new standards (AT); lack of evaluation/certification system which guarantees the quality and suitability of the trainer or teacher (ES, LT where a third of VET teachers are uncertified); limited in-service training of instructors (HU). Some countries mention their specific problems such as lack of mechanisms and reference points to assess the quantitative needs of trainers (BG), spread of self-training practices which do not comply with official requirements (BG) or the situation that most of trainers in the field of energy efficiency are concentrated in higher education institutions (EE).

In response to the need to train the trainers, countries suggest a number of measures including:

- Strengthening of trainings for trainers in public institutions and/or in companies, e.g., presentations and explanations of new plant technologies or field trips to plant manufacturers (AT, BG, CY, UK);
- Training of trainers in projects funded by PHARE or other EU programs (BG) or financed by national stakeholders (SE). Estonia specifically argues for creation, development and support for networks of vocational teachers, professional in-service training courses and academic migration projects for teachers financed by ESF;
- Building of an additional institutional capacity to train the trainers (BG);
- Enhancing trainers’ motivation to train on energy efficiency and renewable energies (AT);
- Interaction among the educational institutions (BG);
- Voluntary participation of trainers in the System of Vocational Qualifications for their certification (CY);
- Allowing certain subjects to be studied through informal studies offered by higher education institutions (EE);
- Involving people from the private sector in teaching, e.g. as prospective co-lecturers (EE);
- Using some experts from universities to build training capability at vocational schools (EE).

It is clear that the overall development of existing accreditation structures (e.g. increasing clarity and transparency of qualification requirements for trainers) may considerably improve effectiveness and efficiency of the current system and in this reduce the estimated numbers of additional trainers.

5.4.4. Training cost estimations

The national status quo reports of countries states provide different examples of calculations of an average cost of training. Some of them calculate the total training cost needed by 2020, other – specify training cost estimates per employee, trainer or training course itself. In addition, due to different scenarios of trainees/ trainers to be trained, margins of the training cost estimations in some countries are rather wide. The Box below summarises the available training cost estimations. The provided information is not directly comparable due to different calculation methods and needs.

**Examples of calculations of average costs of training**

| Individual countries | provide calculations in different manner. For example, Belgium estimates that the overall costs needed for training for the next 7 years period is 121.32 million EUR (more specifically: 33700 trainees x 80 hours x 45 EUR/ day), the Netherlands – 37.5 million EUR, Spain – 28-60 million EUR, Norway - 24.1-48.7 million EUR (for 2012-2026), Bulgaria - 23.32 million EUR, Greece – 15-21 million EUR (based on 3-day course cost of approx. 3000 EUR per person), Slovakia – 3.01 million EUR and Slovenia – 1.5-1.7 million EUR. |
Other countries provide estimates for person training per day, which differ depending on the type and scope of the training. Usually a price per hour for short training sessions is higher than for lengthy trainings. Also, such factors as the materials used, training intensity (proportion of theoretical, practical, and self-studies) and training frequency make an impact on the training price. For example, in Ireland the average cost per person for the training is 150-400 EUR/day, in Belgium – 360 EUR/day (i.e. 45 EUR/hour, that consists of 30 EUR wage-cost and 15 EUR training cost), in Luxembourg and the Netherlands – 250-350 EUR/day, in Lithuania - 100 EUR/day/person. In a case of Denmark participants of CVET courses receive salary compensation (an amount corresponding to unemployment benefits), and pay 15-20 EUR/day for training. Participants who already have a tertiary qualification pay full tuition and unemployed participants are offered full scholarships.

Some countries estimate average training cost per trainee: Portugal foresees 800-1000 EUR/trainee, Bulgaria calculates training cost of 406 EUR per trainee and 300 EUR per trainer, Romania differentiates training cost for certified training programme (consisting of 10 courses) for the Romanian Green Building Council members – 960-1250 EUR and for non-members – 1550-1950 EUR. In former Yugoslav Republic of Macedonia this cost is 3000 EUR and in Croatia – 5500 EUR. Poland indicates average training costs per trainee per week – 500 EUR/week.

Meanwhile, the UK does not provide any particular estimations until 2020, but Scotland allocated more than 1 million EUR to create up to 500 Modern Apprenticeships in Scotland's energy and low carbon industries for 2011/2012 and additional 2.3 million EUR for 1,000 flexible training places in energy and low carbon for 2012/2013 (i.e. appr. 2300 EUR/per trainee/per year); In Wales a 2 million EUR project to deliver low carbon skills is being supported by the European Social Fund (ESF), aiming to train over 1,000 individuals across nearly 500 organisations (i.e. appr. 2080 EUR/per trainee).

In Sweden the average annual cost of one person studying a construction-related programme (incl. meals) in upper secondary school reaches appr. 11 700-14 500 EUR/year.

Some scepticism could be identified in few reports (BE, NL and NO) regarding funding of training courses of employees of construction companies or self-employed workers. One of the main arguments is related to the 'double-cost' of trainings, i.e. besides the cost of the training, timing used for the training as opposed to work, means lost income during that time. The latter also corresponds to the following most important barriers to workers' participation in courses identified in the reports (see section below): a lack of time and high course costs (especially in rural areas with fewer tradesmen to form a customer base for courses: lower participation rate leads to higher training costs). This requires not only innovations in training process, but also in a way CVET is financed in countries.

5.5. Monitoring needs

The level of development of existing national monitoring systems is very different and this leads to very diverse monitoring needs across countries. Some countries focus on missing elements. For example, Latvia argues that no instrument has been designed for forecasting and monitoring development trends in new technologies, worker qualification and training necessary in the sector. Bulgaria seeks to create a system for study and forecasting of the needs of workforce possessing specific skills. Other countries emphasise the absence of an early warning system for the educational and training (AT) or system for monitoring the level of knowledge in the building industry or measuring the effect of competence raising measures (NO).

Meanwhile other countries emphasise the need for improving their already existing monitoring systems. For instance Cyprus, Lithuania, Poland, Portugal and Spain express similar need to reform their fragmentary, insufficiently coordinated, uncooperative systems by introducing more systemic, stable, long-term oriented approaches with good reaction time to the labour market needs.
Financial and economic crisis and shrinking national budgets raise the immediate need of existing monitoring systems for external funding. This is well illustrated by the UK example where a major concern of a well-developed monitoring system based on Sector Skills Councils (SSCs) is insufficient funding and resources to produce accurate and regular labour market intelligence (which to date has monitored sector employment trends and skills needs). The core funding model of SSCs has been changed and from April 2012 SSCs must seek contestable funding. This will have a knock-on effect on qualifications development, as Awarding Organisations could struggle to produce qualifications that are fit for purpose if they lack a relevant evidence base. Monitoring systems in other countries may experience similar funding related needs. The new 2013-2020 period of European Social Fund and opportunities to network at European level by, for example, establishing European Skills Council in the sector may help to offset the financial difficulties of national monitoring systems.

Countries also stress more specific monitoring needs. According to Austria, an enhanced monitoring in further education could be carried out by an extension of certificates, to ensure the long-term quality of the courses. Germany argues for more reliable data which may be collected by developing instruments for ascertaining current and future labour demand by sector, occupation and region (the ‘job monitor’), the conduct of model calculations to forecast labour market developments between now and 2025 and support for pilot programmes in this area. Some countries are eager to create specific institutions (e.g. specialised structure in Bulgaria) or enable existing institutions (e.g. vocational boards in Sweden) to assess the dynamics of demand in the building sector, direct the efforts of the educational and training institutions in the necessary direction and ensure a sufficient number of trained and educated individuals to meet the market needs. Estonia wishes that information on training needs of companies could be conveyed to training providers in consolidated form via professional associations. Meanwhile Hungary speaks of the need to develop a demand-based VET system in which participants are trained in the numbers and for the professions that meet economic needs (i.e. sought-after professions), while the training content also matches market expectations.

Some countries also foresee very complex monitoring needs. For example Slovenia argues that monitoring can be done by governmental institutions, professional organisations, professional chambers or associations, depending on the VET scheme and target group.

Finally, few countries also emphasise that work carried out in their national BUS projects will serve as a tool for monitoring skills needs in the sector. For example, the Netherlands consortium is willing to establish an agreement to keep the status quo analysis up-to-date and develop training records. From the up to date analysis mismatches in skill development can be identified and prevented. In addition, the results of training and retraining around the appointed new specialisations and professions could be clarified. The same applies to Greece. Similarly, United Kingdom emphasises the importance of the 2020 Roadmap which is expected to lead future skills development in the sector.
6. Barriers

This section summarises barriers related to the qualification of the building workers which may hinder the countries’ achievements of the 2020 targets in the building sector. As rightly pointed out in one of the status quo reports, each barrier hindering the improvement of qualification in the scope of BUS Initiative may be considered from the perspective of the final user and that of the worker. However, barriers cannot be identified and addressed too narrowly since this will render their removal in a systemic manner impossible. Barriers should be dealt with from the perspective of the entire system. Following this broad approach, the variety of political, economic, financial, cultural and organizational limitations should be considered. The analysis of barriers follows this approach and is structured into the following five broad groups of barriers affecting qualification of the building workers:

1. Education and training barriers; as well as
2. Administrative, legal and policy-related barriers;
3. Market barriers (e.g. size and structure of the market);
4. Economic and financial barriers; and
5. Cultural and linguistic barriers.

Barriers of each group are discussed in separate sub-sections. Barriers within the group which are mentioned by the highest number of countries are described at the beginning of each sub-section. Other, less often mentioned barriers are listed in bullet points in order of incidence: more often mentioned barriers appear at the top and less often mentioned ones – at the bottom. Summary of steps of analysis of barriers is provided in the Figure below.

Figure 4: Summary of steps of analysis of barriers

Source: Authors.
6.1. Administrative, legal and policy-related barriers

The most prevalent barrier within administrative, legal and policy-related barriers group is related to overall policy environment. Approx. half of countries stress this barrier. Countries stress fragmentation of the political system which is characterised by: excessive number of institutions, lack of coordination of policy implementation, lack of coherence between policy plans and actions as well as different public policies (e.g. weak links between education and training and labour market policies), lack of single national policy strategies (e.g. national programmes supporting new nearly zero-energy buildings, national strategy on climate change) guiding the development of the sector, lack of long-term planning, high number of policy revisions and radical changes in policy priorities and decisions (e.g. U-turns). The end result of this barrier is lack of predictability of the national policy system and uncertainty surrounding actors operating in it. To address this barrier some countries suggested starting from a clear and coherent national policy framework.

Second barrier mentioned by approx. one third of countries is related to the lack of state support in creating and/ or improving national system for continuing vocational education and training of the building workers. Many countries emphasise the need for more qualified and intensive guidance especially for low qualified when they choose training courses, the need for more information on the available training courses (e.g. CVET databases are not known or exploited by the users). It is emphasised in many national status quo reports that current training offer lacks transparency, is complex and disparate. Countries recommended standardising and registering all programmes into one single and clear national database or considerably strengthening efforts to promote training offer including potential use of trade associations and chambers to inform their members of the programmes which they are offering.

Equally often mentioned barriers were related to quality control measures and legislation. With regard to the former countries often miss clear quality standards and measures for their enforcement including: central information system containing statistics, guidance on technological developments and information on the available state support measures; programs and informational campaigns raising awareness on EE and RES among workers and their clients; database of good practices and demo projects; and uniform strategic management system. Status quo reports suggested addressing this barrier by standardising energy certification of buildings, promoting renovation of public buildings and demo projects which could serve as examples for the market and introduction of some compulsory quality requirements to be followed by building companies.

Meanwhile legislative environment was characterised by absence of clear regulatory framework and excessive number of regulations, which often were contradicting, outdated, not corresponding to the EU directives and/ or too often revised. Absence of coherent legislative framework contributes to the above mentioned lack of predictability of the national system and increasing uncertainty for actors operating in it.

Other somewhat less often mentioned administrative, legal and policy-related barriers were the following (those which are mentioned by more countries appear higher):

- **Absence of a national system for anticipation and monitoring of skills needs** including limited capacity to create or improve existing forecasting models and techniques, lack of statistical databases and, sometimes, lack of institution responsible for these tasks. As potential remedy for this barrier countries suggested strengthening of cooperation between stakeholders in, for example, implementation of regular medium- or long-term surveys;
- **Drawbacks of the national certification system** including limited certification of workers or absence of certification altogether, lack of institution or its weak capacities in...
dealing with professional competences, lack of harmonised certification requirements and clear guidance. Reports suggested quite many measures to tackle this barrier including introduction of certification of companies, development of clear national certification standards, introduction of obligatory certification requirement, drawing the regional lists of companies and professionals certified according to legally recognised methods;

- **Bureaucracy and administrative obstacles** including lack of transparency, possible corruption elements within the system, too slow policy decisions and their implementation, administrative delays, politicization of resource allocation and preferential treatment of some market segments. This barrier largely contributes to the lack of trust in national institutions and hinders development of EE and RES market in countries; and

- **Limited institutional capacity and willingness** to develop energy efficiency and renewable energy services areas within the building sector including lack of human resources, incompetence, lack of awareness and motivation to formulate and implement EE and RES policy agenda in the sector.

The Box below presents some examples of good practices which are adopted by some countries to address barriers mentioned in this sub-section.

**Examples of good practices**

| Germany | Within the framework of KOMZET – the Construction and Energy Competence Network, 14 competence centres throughout Germany in the construction and energy sector have been cooperating with each other since 2006. The individual centres with their core tasks of providing inter-company IVET and CVET programmes differ in size, ownership and the training and advisory services offered. Each has a different focus in the construction and energy sector, ranging from "green" construction and refurbishment via vocational training and guidance, to involvement in construction technology research. Nevertheless they all have the common goal of promoting sustainability, wanting to ensure that new technological developments are directly transferred into the routine work of skilled craft companies and that energy-saving technologies are introduced into the sector on a wide scale. Measures used include the exchange of experts, the development of standards, and the development and testing of innovative VET programmes with the accompanying course material. In doing so, they focus on providing more effective vocational training and guidance within the network, thereby improving work quality and making the knowledge existing in each competence centre and the VET offerings developed there available to a wide specialist audience. Whatever the VET requirements, the wide range of individual VET offerings and skills and the ability to bundle them in individual packages enables requirements to be met. |
| Germany also has a quality assurance instrument - the inter-company apprentice teaching programme (Überbetriebliche Lehrlingsunterweisung or ÜLU). The purpose of an apprenticeship in the skilled craft sector is to enable apprentices to become experts in the many facets and constantly changing requirements of their working environment, able to come up with solutions for the complex tasks they are faced with. In Germany, IVET takes place via the apprenticeship system. VET colleges are there to provide the theoretical basis, while companies and inter-company VET centres offer a practical setting. Together they form the environment for gaining an initial vocational qualification. Small skilled craft companies in particular, with their often specialised production or service organisations, are not always in a position to cover all the necessary aspects of an apprenticeship. For this reason, Germany provides the additional instrument of the "inter-company apprentice teaching programme". This instrument enables certain parts of an apprenticeship programme to take place outside the company where the apprentice is employed. The ÜLU programme thus constitutes a qualification instrument specific to certain occupations on the basis of the respective apprenticeship framework. The programme takes place in inter-company workshops established by guilds or chambers. Skilled training staff is available to enable apprentices to develop a basic set of professional capabilities. Courses specific to individual occupations are offered, with 6-12 apprentices from member companies taking part. Courses are full-time and normally last 3-4 weeks. The ÜLU programme is of particular importance for the construction sector, as, due to work taking place on different building sites, it is often not possible to set up a long-term learning environment. The result is that apprentices in the construction industry spend 26 weeks of their apprenticeship in ÜLU training centres. In 2011, more than 429,000 apprentices in Germany took part in some 49,000 ÜLU courses. The content of the ÜLU courses is developed by the respective trade associations together with the HPI in accordance with the respective apprenticeship framework, which in turn is defined by the two social partners in conjunction with the Federal Government. The ÜLU programmes are subsidised by the state, with the Federal Government, the Länder and the skilled craft companies bearing the running costs. In some cases, the European Social Fund is also used. The ÜLU programme plays a decisive role in ensuring the quality of an apprenticeship in the skilled craft sector, complementing and further developing the instruction received on-the-job and promoting the systematic development of apprenticeship content. It ideally complements an apprenticeship in a company with... |
specialised production or service organisation. In the face of such changing overall conditions as greater use of technology, demographic change and deficits in the IVET maturity of young people, ÜLU is gaining in importance as a compensatory function and as a technology transfer instrument. In the context of ÜLU courses it is for example possible to raise the IVET level of young people to meet certain basic standards. New curricula for new technologies can be developed and implemented quickly and in sync with requirements.

**Finland** introduced occupational safety card training is nationwide training whose objective is to improve safety at the workplace. The card can be earned at an approved course that includes information on workplace and job task risks. The card is valid for five years. The adoption of the occupational safety card at the workplace is voluntary. The objective is to improve practical co-operation at common workplaces between the client and the supplier companies, support work guidance at common workplaces, provide basic information regarding occupational safety, reduce the amount of overlapping training provided by various clients, foster and enhance the occupational safety expertise of one’s own staff at the workplace, and attempt to reduce the frequency of accidents and near-miss situations.

In the **Netherlands** how a learning institution ensures that its students obtain their degree is entirely up to that institution. Schools are free to shape their education programmes as they deem fit. The Ministry of Education, Culture and Science does intend however to standardise (some of the) examinations (exam profiles). A final decision in this matter is still pending. The Dutch Education Inspectorate monitors the quality of education and of examinations held in certified schools. It regularly conducts audits in intermediate vocational (MBO) schools. The audits include all parties involved: enquiries may be made of teachers, businesses and students. Should the examination quality fall short, the intermediate vocational (MBO) school is granted the opportunity, albeit limited, to deliver the required quality. In some cases, when the expected quality is lacking altogether, the Inspectorate may apply a fine. If the targets are not met within the allocated time, the Inspectorate may withdraw the school’s licence for that particular course.

In **Portugal** the Certification System for Training Entities, together with other mechanisms, is one of the instruments for assuring the quality of the National Qualifications System in Portugal. It recognises those pedagogic practices that are appropriate for training entities to develop training activities and audits the certified training entity on regular basis to evaluate compliance with certification requirements and results obtained with its activity. The certification system for training entities is run by the Directorate General for Employment and Labour Relations.

Oriented particularly towards adults, a skills examination in **Finland** is a flexible way to earn a qualification. In skills examinations, the skills gained in working life are demonstrated. These skills may have been acquired through working experience, studies, or other activities. All construction sector-related vocational qualifications, first degree, vocational qualifications, and specialist vocational qualifications can be earned with skills examinations. A skills examination is performed by demonstrating the skills, required in the qualification’s prerequisites, gained primarily in production and service situations related to genuine working life. A candidate for a skills examination may participate in preparatory training. A person possessing the requisite skills may perform a skills examination without participating in schooling. Skills examinations can be performed as a vocational qualification, first degree, vocational qualification, and specialist qualification.

**Source:** National status quo reports

### 6.2. Market barriers

The most prevalent market barrier present in roughly half of status quo reports concerns small market size of EE and RES systems and their limited demand. Limited demand is noticed at both sides – from consumers and from building companies. Consumers are not keen to install EE and RES systems due to relatively low ‘traditional’ energy prices, acceptance of low level of comfort in existing housing, inadequate information as regards the financial and environmental benefits of systems and the fact that instalment of energy saving systems almost always entails a (substantial) investment up-front. Meanwhile small EE and RES systems market size means higher construction costs for companies. They also lack information and knowledge from the state as well as some public incentives which could counterbalance the high short-term costs related to work in the niche market. Recent economic and financial crisis reduced the financial capacities both of consumers and of companies and hereby further negatively affected the market. The majority of investments that occur are subsides by public programmes. Small market size and low demand for EE and RES systems in turn leads to low interest in related training. There were not many solutions proposed in the reports in order to address this barrier. One of the reports
suggested increasing the demand amongst potential users by increasing information and raising the legal requirement for minimum heat consumption threshold in buildings which should intensify the rate of renovation.

Other barriers mentioned by one third of countries or less were the following (those mentioned by more countries appear higher):

- **Low qualification of existing workers** including limited possibilities for workers to specialise. Low educational level of the workforce is a threat to their active participation in training and to the implementation of new technologies. However lack of qualification of existing workforce is not necessarily perceived as barrier by companies in the building industry as long as they find satisfactory demands for the services they already provide. Thus it is very important to educate consumers so that they demand adequate quality of services and in this way increase the need for companies to train their staff. One of the reports suggested enforcing energy efficiency training mostly to cover workers with the lowest qualifications who are often left behind in terms of training due to different socio-economic reasons;

- **High share of project-based work, sub-contracting and informal economy** – combination of these and other characteristics of the industry partly explains widely spread lack of professional commitment and low demand for energy related training;

- **Fragmentation of the building sector** including unequal spread of the building projects as well as labour force in countries (e.g. their concentration in capital regions) and high share of SMEs and self-employed workers. Fragmentation of the sector severely limits training demand. Small companies and companies located in less economically developed regions of countries are less capable of developing their personnel in a systematic fashion. Meanwhile self-employed seasonal workers are usually not interested in participating in educational programs;

- **Negative demographic trends** including decreasing cohorts of young workers entering the labour market and ageing of the workforce which lead to the lack of building workers. Furthermore, older workers often do not have the latest skill sets and are less keen to train;

- **High migration and turnover of employees** leading to a constant change of personnel within companies. This leads to low motivation of companies to train their workers as the latter may leave soon after the training is completed;

- **Limited capacity of company management** (esp. that of SMEs) to anticipate and manage the needs related to implementation of energy efficiency and renewable energy measures in buildings. This includes relevant experience, adequate human resources policies, and awareness of qualification needs of workers. One of the reports saw the need for improvement of the leadership and management skills of employers both to identify training needs, but also more specifically, to increase their awareness of what meeting the 2020 targets means for them;

- **High instability of the building industry** stimulated by economic and financial crisis. The latter has significantly reduced company investment in new technologies, processes and know-how, increased unemployment and uncertainty for all actors within the industry. This considerably weakened the training demand among workers and companies;

- **Infrastructural characteristics of existing buildings or of the direct surroundings are unfavourable for implementation of energy saving measures.** Examples include lack of space to install roof insulation, monumental status of a building or qualification of the building as a protected urban scene impeding insulation of the outer walls.
6.3. Economic and financial barriers

Barrier which appears in more than a half of national status quo reports relates to lack of funds for training. The cost of training is commonly considered too high by all relevant stakeholders. The available support is often short-term, based on one-off schemes and lacking coherent national strategy. Economic and financial crisis has further decreased the available funding. To tackle this barrier countries offered plenty of recipes which basically fall down to financial and non-financial ones. The former include extension of funding for SMEs, introduction of new funding mechanisms (incl. more active use of European funds, establishment of parity funds in the sector at European level or potential involvement of banks in provision of funds for training) and introduction of financial incentives for workers financed from public and/or private sector. Non-financial recipes relate to exploration of additional cooperation patterns among training institutions and businesses, creation of new training procedures which would change companies’ understanding of training as a cost to a opportunity to improve their performance and serve more clients and making qualification an obligatory requirement (e.g. in public tender procedures).

An equally often mentioned barrier, which is yet another cause of under-investment in training by workers and companies, is related to uncertainty of results of training. None of the reports explicitly mentioned this. However it was often mentioned that companies emphasise loss of hours worked, lost productivity, absence from work as major reasons for not training their employees. Companies are uncertain of the results of training, so they see it as a cost and not as an opportunity. In some of the reports it was said that companies changed their priorities and that training lost is importance for them. Financial crisis has brought significant uncertainty for companies and this, coupled with high employee turnover (especially of low and medium qualified) and increasing short-termism, further limited their support for training. This is especially relevant for SMEs in which the often one and only priority is to survive after the crisis. Countries argue that it would be important to demonstrate companies in which the acquisition of new or improvement of existing skills would reduce their uncertainty by, for example, extending their client base. Reports argued for increased flexibility of training provision, for example: mixed training, based on remote training and short direct sessions to acquire the practical abilities; introduction of “learning building sites” where willing sites host training for workers who learn while working and are therefore duly paid; trainings done on smaller projects such as small retrofitting of public buildings; courses tailored for part-time or quasi part-time delivery to facilitate training for those currently in employment. Some countries emphasised more training outside working hours, others – strengthening of internal training sessions led by the master craftsmen in companies. Meanwhile other countries argued for more significant state support for proper and active education and training of unemployed workers.

Other barriers mentioned by one third of countries or less include the following (those mentioned by more countries appear higher):

- Lack of state support for implementation of energy efficiency and renewable energy measures in buildings. Countries mentioned absence of adequate state support system which ensures the economic added value (e.g. profitability) for companies performing high quality work and which reduces high operational costs of EE and RES technologies for consumers. Furthermore, state is expected to provide guidance on measures and information on the available support instruments for implementing them. State should properly use the available external funding (e.g. EU funds), to decrease the financial risk for companies and thereby ensure the long-term perspective of EE and RES markets in the building sector;

- Need for more incentives for training including ones for existing workers to participate in training, for in-service practice supervisors and mentors, for companies to finance training and create opportunities for practical training. Some of reports are sceptical
of economic incentives and argue that companies are most likely to promote training only if there is a legislative requirement to do so. There are few, but interesting suggestions how to address this barrier. One report proposed a clear linkage of training with existing job opportunities, so that workers see very tangible results of training. Another report argued that it would be important to take into account the costs of non-training and poor quality of work which could change opinion of companies with regard to results of training;

- **Reduction of public, but also private investments for implementation of energy efficiency and renewable energy measures in buildings.** This barrier is very often linked to the effects of economic and financial crisis such as discontinuation of public grants, increasing reliance on short-term objectives within the state support system, declining purchasing power of people, reluctance of the banking system to grant loans for business. This adds to uncertainty of companies and diverts their attention from training to other priorities;

- **Finally, some reports emphasised limits of public procurement system promoting low price at the expense of quality of building works.** Lowest price criteria which is widespread in public procurement systems across countries focuses only on the final building/ equipment price and assigns lower importance or completely disregards further operating costs, quality, durability, or other important long-term characteristics. As a result, it is unclear whether the building passive and active energy saving measures will be implemented with high quality. One report suggests that the planning process should stress the assessment of the sustainability of the retrofitting, taking into account environmental (nearly zero-energy buildings), but also economic and social indicators. Within the construction and installation process, the policies should require competent contractors and suppliers. This will – in longer term – add value to all stakeholders. It will also be good for the construction business in general because the quality and sustainability in longer term will overcome quantity and short-term effects.

The Box below presents some examples of good practices which are adopted by some countries to address barriers mentioned in this sub-section.

### Examples of good practices

<table>
<thead>
<tr>
<th>Country</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>Vienna Employment Promotion Fund (waff) provides for Viennese with a „Training Account” (up to 300 € for further training) as well as the “Account plus” (up to 3000€ for the later acquisition of a final apprenticeship) and the “training bonus” (apprenticeship trainees)</td>
</tr>
<tr>
<td>Belgium</td>
<td>The Fund for Vocational Training in The Construction Industry (fvb-ffc Constructiv) which was set up in 1965 as a Fund for Social Security, tasked to promote and support training of present and future workers in construction and to safeguard the quality and results of their training. The importance the sector attaches to training was already made clear from the start by the unique financial arrangements for this fund. Fvb-ffc Constructiv was and is in actual fact financed by a percentage that all construction companies pay on payroll payments. In this way the cost of training is fully consolidated.</td>
</tr>
<tr>
<td>Estonia</td>
<td>the training offered by the private sector predominantly is financed by undertakings or participants. If a person pays for the training themselves, he has the right on the basis of the Income Tax Act to a tax refund for the amount spent on training, the prerequisite being that a training provider registered with the Ministry of Education has to use. Alongside the larger training projects, in 2007-2012 companies have also supported the measure “Development of knowledge and skills – training voucher”. Only very few construction topics have thus far been supported as part of the training voucher, such as terms of construction contracts, issuer of building energy labels and building energy auditor training.</td>
</tr>
</tbody>
</table>
| Hungary       | under the effective Labour Code, certain types of training leave are permitted, provided the employee is enrolled in formal education in the school system or if continuing education is mandatory in the given position or required by the employer. In case of the former, employees may be entitled to an absence of four workdays per examination and an additional 10 days for working on their theses. The duration of additional training leave is at the discretion of the employer taking into consideration the certificate issued by the educational institution at hand, warranting the duration of training. In this case, training leaves shall constitute unpaid leaves – except for studies in primary education (ISCED 1A-2A). When participation is mandated by the employer, however, leave shall be considered as paid. Employees may also be eligible for training leave in other cases, subject to the provisions of a
Learning agreement concluded with their employers. In most cases, employers agree to paid training leaves (or require that hours lost due to training be made up at a later date) and are willing to cover costs including tuition, books and exam fees, sometimes even travel and other expenses. In exchange for the above, employees undertake to maintain their employment for a specified period that is typically equivalent to the duration of training, for a maximum of five years.

In *Sweden*, financing of upper secondary schools is conducted with 'education vouchers', an amount from tax funds that the municipalities distribute among the schools for each student. Per student, the typical value for education vouchers for building-related education is approximately SEK 100,000 (EUR 11,864).

Meanwhile the *United Kingdom* has created *ConstructionSkills* – a partnership between the Construction Industry Council (CIC), Construction Industry Training Board (CITB)-ConstructionSkills Northern Ireland and CITBConstructionSkills, which represent England, Scotland and Wales. The funding mechanism is from a levy scheme at a rate of 0.65% on earnings paid by employers to direct labour and labour only subcontractors. This amount totalled to just over £3 million (approximately €3.7 million) in 2010/2011. The largest proportion of expenditure is on grants to employers with the majority of the balance allocated to training services and direct training provision. No grant aid is received from government or public authority sources.

**Source:** National status quo reports

### 6.4. Education and training barriers

The most prevalent barrier within the group of education and training barriers, mentioned by more than half of the countries, concerns *weaknesses of national education and training systems*. Most often weaknesses that are cited in the national status quo reports include low quality of the training offer, outdated programmes which are slow to adapt to the latest technological developments, lack of consideration of labour market needs, lack of flexible training options (e.g. training modules) and more innovative training methods and lack of balance of the training content (e.g. too theoretical training programmes which are not illustrated with examples from practice). To tackle this barrier, countries recommended further strengthening of the links between course attendees, trainers and business, updating training programmes so that they conform to technological advancements and market trends, increasing the share of practical training and introducing minimum quality standards for any training offer to comply.

The other equally often mentioned barriers concern *limited training supply* and underdeveloped training infrastructure and materials. With regard to the former countries stressed lack of training courses for low qualified workers/ workers without prior training, lack of on-the-job training and apprenticeship places in the industry, limited training opportunities (e.g. dates of training not optimal for seasonal workers), lack of clarity to which extent skills in relation to energy savings and sustainability form a part of the new curricula. There were not many suggestions how to increase the training offer. Mentioned ones include extending training offer to other target groups or introducing incentives to stimulate on-the-job training and apprenticeship offers.

Meanwhile *underdeveloped training infrastructure and materials* is characterised by countries with insufficient and outdated training equipment and facilities, shortage of training materials such as books, publications, excessive centralisation of training centres and limited regional or local access to the nearest training facilities. Countries suggested upgrading and modernising existing infrastructure so that it conforms to technological advancements and market trends, creating new training centres, strengthening cooperation among training institutions and businesses (e.g. to increase apprenticeship offer), defining minimum quality requirements for existing training facilities and ensuring more equal spread of training facilities.

Approx. one third of all countries draw attention to the *lack of qualified trainers* and low interest in training. Countries highlighted that current trainers leave the labour market due to retirement and workload for remaining trainers is increasing. Number of highly qualified trainers is becoming increasingly insufficient also due to unsatisfactory qualification of large
share of current trainers. However programmes, facilities and incentives for training of trainers are lacking. Some reports stressed the need for taking immediate measures to address the ageing trend and increasing the number of qualified trainers (e.g. through improvement of remuneration packages).

Partly related barrier, mentioned by approx. one third of countries, is **lack of motivation and interest of trainers, workers and companies to train**. The need for training is often not recognised among these groups. Furthermore, reports stressed that there is no particular prestige in continuing vocational education and training – workers usually do not receive a new job title or anything else that demonstrates the new competences. According to countries, it is very important to firstly explain the relevance of training to workers. Ireland, for example, showed that once relevance of training has been explained, there was an overwhelming opinion that up-skilling in some form on energy related competences should be provided for all construction workers. There was also a recognised need to translate training results into something tangible such as more visible and documentary evidence. Some countries considered it important to find a way to recognise formal, non-formal, informal and experience-based knowledge.

Other less often mentioned (by quarter of countries or less) barriers included the following (barriers mentioned by more countries appear higher):

- **Shortage of cross-trade knowledge and skills** (e.g. installation of few RES systems) including insufficient coordination between occupations and their ‘borderline’ skills and unsatisfactory interdisciplinary training opportunities within upper secondary and continuing education and training systems. It was suggested in the reports that cross-trade knowledge should be provided in special courses, strengthening coordination between disciplines, issuing professional’s on-the-job training booklet providing such knowledge, adjusting incentives, so that they motivate workers to gain such cross-trade knowledge (e.g. judgement of quality of worker’s work based on his contribution to the entire process);

- **Lack of cooperation between different stakeholders** and especially between vocational schools and businesses in, for example, improving training materials and equipment or organising financing of training. Furthermore, some countries also mention weakness of national professional associations and absence of consensus between stakeholders (e.g. shared vision of training standards). Recommended solutions to this barrier include intensive exchange of knowledge, coordination of interests and concrete partnership projects, wide-ranging public discussions on actual topics and strengthening the role of associations as channels of communication;

- **Insufficient and decreasing number of students** (incl. share of school drop-outs) is stressed by few countries. This often results in lower/ decreasing pay for teachers and practical training supervisors which may lead to quality problems. According to one status quo report, vocational education institutions should focus more on retraining of adults for additional qualifications. As the number of students in these institutions is decreasing, this would provide both improved qualifications of workers and work for educational institution;

- **Low capacity of training providers** which is characterised by the fact that training providers are not prepared to face changing market conditions, lack transparency (e.g. accreditation of training providers in some regions is carried out based on formal and not relevant criteria) and do not exploit all their potential to provide training. Some providers are not even aware of the impending changes in the requirements for buildings. Countries recommended strengthening selected training providers and introducing high quality training courses hoping that final users will be no longer induced to choose low quality organisations or introducing stricter and relevant accreditation requirements.
The Box below presents some examples of good practices which are adopted by some countries to address barriers mentioned in this sub-section.

**Examples of good practices**

**Austria** has created the possibility of modular apprenticeship, modernised existing and established new apprenticeship trades. Apprenticeship consists of three “building blocks”: a) basic module - this usually takes two years and includes basic skills and activities of an apprenticeship profession; b) main module - it takes at least one year and provides advanced knowledge and skills beyond the basics that constitute the typical qualifications of one apprenticeship trade or of more professions out of a certain trade area; and c) special module which lasts half a year or one year and provides specific modes of production and services. Each modular apprenticeship profession must contain a basic module and at least one main and special module. The modular apprenticeship helps, among other issues, to meet the urgent qualification needs of a trade and increase the job mobility of young people.

In **Belgium** there are specific training centres by sector, which also exist for the construction sector. Their aim is to enable a faster response of the training and education market to be offered and to develop specific and innovative training courses. For Flanders it is Edutec, for the Walloon Region it is Construotec and for Brussels it is the Vocational Reference Centre for Construction (BRC in Dutch).

**Cyprus** has so-called ‘Accelerated Initial Training Scheme’ which is a multi-company initial training scheme operated by the Human Resource Development Authority (HRD) which aims to meet significant labour shortages through theoretical and practical training in occupations which are currently in demand. Training programmes are organised in cooperation with the Cyprus Productivity Center and the Higher Hotel Institute of Cyprus. The duration of this type of training programmes ranges from 21 to 25 weeks, depending on the requirements of each occupation. They include theoretical and workshop sessions at a training institution and practical training in industry. The HRDA covers all costs of the institutional training. In addition, trainees receive a weekly allowance.

In **Estonia** training for vulnerable groups is financed through European Social Fund measures as well – for instance, SA Innove’s qualified workforce supply project competitions, ARIB rural population activation projects. Training projects funded via ESF measures are aimed at the unemployed, at people who are inactive on the job market for various reasons and employees who are in danger of dropping out of the labour market because they belong to a risk group (e.g. older people, non-Estonians, parents of young children, people with caregiver duties, etc.). Few of the projects include construction study, only a few in-service study programmes for construction workers and welder training can be listed. Obviously training element of these projects needs to be further strengthened to reach their higher effectiveness and more significant impact.

**Source:** National status quo reports

### 6.5. Cultural and linguistic barriers

The dominant barrier within the cultural and language group, mentioned by approximately half of countries, is related to the large proportion of foreign building workers and especially to their language skills. Many national reports stressed that non-national workers have difficulties to communicate in the local language or do not speak it at all, and have problems with literacy. Besides numerous misunderstandings in a work process, this barrier also prevents foreign workers from accessing desirable training courses. Some countries suggested producing a glossary of terms which are most important for the construction of energy efficient buildings and installing renewable energy systems. It is also recommended to create multimedia products with short instructions works for these tasks.

Another cultural and language barrier, stressed by approximately a quarter of countries, is related to the unfavourable image of building professions. According to the national reports, these building professions are often unfavourably perceived, characterised by low reputation, professional status and low social prestige. Building professions are surrounded by wrong public impressions and often seem unattractive to students who prefer higher education studies. The image of building professions could be improved with the help of broad public communication campaigns and initiatives.
6.6. Summary of most important barriers

The barriers that are most often mentioned in national status quo reports span across all five groups and in one or another way affect the qualifications of building workers and, in turn, challenge countries' achievements of the 2020 targets in the sector:

- The most prevalent administrative, legal and policy-related barrier is a fragmented and unstable political environment characterised by, for example, an excessive number of institutions, lack of coordination of policy implementation, lack of coherence between policy plans and actions, or frequent changes in policy priorities and decisions. The result is a lack of predictability of the national policy system and uncertainty of actors operating in it, which leads to their lower training demand;
- The dominating market barrier relates to the small market size of EE and RES systems and their limited demand. Limited demand is noticed on both sides – from consumers and from building companies. Small market size and low demand for EE and RES systems in turn leads to low interest in related training;
- Two equally important economic and financial barriers are the lack of funds for training and uncertainty of the results of training. The perception by all relevant stakeholders that the costs of training are too high is further reinforced by economic and financial crisis. The available support is often short-term, based on one-off schemes and lacking a coherent national strategy. Meanwhile workers and especially companies are uncertain of the results of training, so they see it as a cost and not as an opportunity. The financial crisis has brought even more uncertainty and this, coupled with high employee turnover and increasing short-termism, has further decreased their support for training;
- Three education and training barriers that were dominating in the reports include weaknesses of national education and training systems (e.g. low quality of the training offer, outdated programmes, lack of consideration of labour market needs, inflexible training provision and lack of balance between practical and theoretical training), limited training supply (e.g. lack of training courses, on-the job training opportunities and apprenticeship places in the industry) and underdeveloped training infrastructure and materials;
- The main cultural and linguistic barrier was related to the large proportion of foreign building workers and especially to their lack of language skills. Besides numerous misunderstandings in a work process, limited language skills also prevent foreign workers from accessing to desirable training courses.

A further step of the analysis of barriers could be to rate barriers in terms of their impact – for example, barriers with great, significant, moderate, low and insignificant impact. This has been done in the Greek status quo report. Such analyses would help to determine which barriers are the most important for the country (i.e. that have vital negative or positive consequences). Countries could then focus their public resources on addressing these particular barriers. Such a strategy could be particularly useful during periods of economic and financial hardship.
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### Glossary of abbreviations

<table>
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<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>CEDEFOP</td>
<td>European Centre for the Development of Vocational Training</td>
</tr>
<tr>
<td>CHP</td>
<td>Combined Heat and Power</td>
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<td>CIP</td>
<td>Competitiveness and Innovation Programme</td>
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<td>CVET</td>
<td>Continuing Vocational Education and Training</td>
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<td>EACI</td>
<td>Executive Agency for Competitiveness and Innovation</td>
</tr>
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<td>ECVET</td>
<td>European Credit System for Vocational Education and Training</td>
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<td>EE</td>
<td>Energy Efficiency</td>
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<td>EQF</td>
<td>European Qualification Framework</td>
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<td>ESF</td>
<td>European Social Fund</td>
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<td>EUROSTAT</td>
<td>Statistical office of the European Union</td>
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<td>HPACS</td>
<td>Heat pumps and Air conditioning Systems</td>
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<td>IEE</td>
<td>Intelligent Energy Europe Programme</td>
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<tr>
<td>INTERREG</td>
<td>Community initiative which aims to stimulate interregional cooperation</td>
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<tr>
<td>ISCED</td>
<td>International Standard Classification of Education</td>
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<td>IVET</td>
<td>Initial Vocational Education and Training</td>
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<td>LED</td>
<td>Light-emitting diode</td>
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<td>NACE</td>
<td>Statistical classification of economic activities in the European Community from the French Nomenclature statistique des activités économiques dans la Communauté européenne</td>
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<td>PHARE</td>
<td>Programme of Community aid to the countries of Central and Eastern Europe</td>
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<td>PV</td>
<td>Photovoltaic</td>
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<tr>
<td>RES</td>
<td>Renewable Energy Sources</td>
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<td>SME</td>
<td>Small and Medium Sized Enterprise</td>
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<td>VET</td>
<td>Vocational Education and Training</td>
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<td>UK</td>
<td>United Kingdom</td>
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</tbody>
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## Country factsheets

<table>
<thead>
<tr>
<th>Country Data</th>
<th>Comments + Reference to Status Quo Report</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Austria</strong></td>
<td></td>
</tr>
<tr>
<td>Number of building on-site workers and craftsmen in the construction sector</td>
<td>273,655 (2009)</td>
</tr>
<tr>
<td>Number of on-site workers and craftsmen trained per year through CVET</td>
<td>5,461 (2012)</td>
</tr>
<tr>
<td>Estimates of additional building on-site workers and craftsmen needed by 2020</td>
<td>138,964</td>
</tr>
<tr>
<td>Number of building on-site workers and craftsmen requiring up-skilling by 2020</td>
<td>25,000</td>
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<tr>
<td><strong>Belgium</strong></td>
<td></td>
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<tr>
<td>Number of building on-site workers and craftsmen (+ data year)</td>
<td>166,754 (2011) (Status quo report page: 8)</td>
</tr>
<tr>
<td>Number of on-site workers and craftsmen trained per year through Initial education (IVET) (+ data year)</td>
<td>7,357 (2011) (Status quo report page: 111)</td>
</tr>
<tr>
<td>Number of on-site workers and craftsmen trained per year through Continuing education (CVET) (+ data year)</td>
<td>2,053 (2011) (Status quo report page: 102)</td>
</tr>
<tr>
<td>Estimates of additional building on-site workers and craftsmen needed in the sector by 2020</td>
<td>-</td>
</tr>
<tr>
<td>Number of building on-site workers and craftsmen requiring up-skilling on EE and RES by 2020</td>
<td>33,400 This is based on an estimate of annual turnover and the unqualified intake determined from it. This is estimated at 14% per annum. Accordingly this means around 100% of the total of vocational practitioners over a 7-year period. A quarter of the intake leaves the construction sector immediately, thus leaving 75%. Of these groups it is estimated that one in three will need training in the period leading up to 2020, or 25% of the total number of vocational practitioners in 2011. This percentage is estimated at 33% for CH fitters and Plumbing installers, for construction machinery, road workers and the ‘others’ category, this percentage is estimated at 10%. (Status quo report page: 8)</td>
</tr>
<tr>
<td>3-5 occupations with the highest numbers of workers requiring up-skilling on Energy Efficiency and Renewable Energy Sources amongst building on-site workers and craftsmen</td>
<td>Bricklayers, Joiners, Roofers (Status quo report page: 8)</td>
</tr>
<tr>
<td>Number of additional trainers needed</td>
<td>300 33,400 needed in training. One trainer can train 50/60 people during one year.</td>
</tr>
<tr>
<td>Country Data</td>
<td>Comments + Reference to Status Quo report (page)</td>
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<tr>
<td><strong>Bulgaria</strong></td>
<td></td>
</tr>
<tr>
<td>Number of building on-site workers and craftsmen (+ data year)</td>
<td>131 000 (09.2013)</td>
</tr>
<tr>
<td>The data refers to employed in the construction sector (F)</td>
<td></td>
</tr>
<tr>
<td>(Status quo report page: 68 and below )</td>
<td></td>
</tr>
<tr>
<td>Number of on-site workers and craftsmen trained per year through Initial education (IVET) (+data year)</td>
<td>1547 (II and III class) (2010)</td>
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<tr>
<td>(Status quo report page: 72 )</td>
<td></td>
</tr>
<tr>
<td>Number of on-site workers and craftsmen trained per year through Continuing education (CVET) (+data year)</td>
<td>6772 (Construction and Electrical engineering and energy sector combined, data available for each profession) (2010)</td>
</tr>
<tr>
<td>(Status quo report page: 73 )</td>
<td></td>
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<tr>
<td>Estimates of additional building on-site workers and craftsmen needed in the sector by 2020</td>
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<tr>
<td>(Status quo report page: 66-67)</td>
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<tr>
<td>Number of building on-site workers and craftsmen requiring up-skilling on EE and RES by 2020</td>
<td>63195</td>
</tr>
<tr>
<td>Total number of trainings, in limited cases one worker could pass through more than one training (National Roadmap, Appendix 4, page 12: )</td>
<td></td>
</tr>
<tr>
<td>3-5 occupations with the highest numbers of workers requiring up-skilling on Energy Efficiency and Renewable Energy Sources amongst building on-site workers and craftsmen</td>
<td>Technician / Installer in energy equipment and systems – RES Technician / Installer in energy equipment and systems – Thermal engineering Electrician / Electrician-installer – Electrical wiring systems Construction – Builder – Indoor sheathings and surfaces (National Roadmap, Appendix 4, page 9-12) (Status quo report page: 82-90 )</td>
</tr>
<tr>
<td>Number of additional trainers needed</td>
<td>1000</td>
</tr>
<tr>
<td>(Status quo report page: 9 )</td>
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<tr>
<td>Country Data</td>
<td>Comments + Reference to Status Quo report (page)</td>
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</tr>
<tr>
<td><strong>Croatia</strong></td>
<td></td>
</tr>
<tr>
<td>Number of building on-site workers and craftsmen (+ data year)</td>
<td>50,218 on site workers</td>
</tr>
<tr>
<td>(Data year: 2011)</td>
<td>(Status quo report page: 23)</td>
</tr>
<tr>
<td>Number of on-site workers and craftsmen trained per year through Initial education (IVET) (+data year)</td>
<td>The number of students who attended schools in the 2006 to 2009 period: 9445</td>
</tr>
<tr>
<td></td>
<td>The number of students who attended schools in the 2009 to 2013 period: 9396</td>
</tr>
<tr>
<td>Number of on-site workers and craftsmen trained per year through Continuing education (CVET) (+data year)</td>
<td>N/a</td>
</tr>
<tr>
<td>Estimates of additional building on-site workers and craftsmen needed in the sector by 2020</td>
<td>21,600</td>
</tr>
<tr>
<td>Number of building on-site workers and craftsmen requiring up-skilling on EE and RES by 2020</td>
<td>37,600</td>
</tr>
<tr>
<td>3-5 occupations with the highest numbers of workers requiring up-skilling on Energy Efficiency and Renewable Energy Sources amongst building on-site workers and craftsmen</td>
<td>Wall, roof insulation, carpentry: plasterer, bricklayer, carpenter, wall painter/painter, roofer, dry-liner</td>
</tr>
<tr>
<td></td>
<td>(Status quo report page: 73)</td>
</tr>
<tr>
<td></td>
<td>(Roadmap page: 23)</td>
</tr>
<tr>
<td>Number of additional trainers needed</td>
<td>250</td>
</tr>
<tr>
<td></td>
<td>(Status quo report page: 67)</td>
</tr>
<tr>
<td>Country Data</td>
<td>Comments + Reference to Status Quo report (page)</td>
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<td>------------------------------------------------------------------------------</td>
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</tr>
<tr>
<td><strong>Cyprus</strong></td>
<td></td>
</tr>
<tr>
<td>Number of building on-site workers and craftsmen (+ data year)</td>
<td>34419 (2010)</td>
</tr>
<tr>
<td>Number of on-site workers and craftsmen trained per year through Initial education (IVET) (+data year)</td>
<td>2045 (2009)</td>
</tr>
<tr>
<td>Number of on-site workers and craftsmen trained per year through Continuing education (CVET) (+data year)</td>
<td>168 (2011)</td>
</tr>
<tr>
<td>Estimates of additional building on-site workers and craftsmen needed in the sector by 2020</td>
<td>4538</td>
</tr>
<tr>
<td>Number of building on-site workers and craftsmen requiring up-skilling on EE and RES by 2020</td>
<td></td>
</tr>
</tbody>
</table>
| 3-5 occupations with the highest numbers of workers requiring up-skilling on Energy Efficiency and Renewable Energy Sources amongst building on-site workers and craftsmen | 1. builders  
2. plumbers  
3. refrigeration technicians | (Status quo report page: 107) |
<p>| Number of additional trainers needed                                         | N/A                                              | (Status quo report page: ) |</p>
<table>
<thead>
<tr>
<th>Country Data</th>
<th>Comments + Reference to Status Quo report (page)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Czech Republic</strong></td>
<td></td>
</tr>
<tr>
<td>Number of building on-site workers and craftsmen (+ data year)</td>
<td>466400 (2011) (Status quo report page: 18)</td>
</tr>
<tr>
<td>Number of on-site workers and craftsmen trained per year through Initial education (IVET) (+data year)</td>
<td>5305 (2012) (Status quo report page: 82)</td>
</tr>
<tr>
<td>Number of on-site workers and craftsmen trained per year through Continuing education (CVET) (+data year)</td>
<td>Est. 150 000 man-days/year (Status quo report page: 93)</td>
</tr>
<tr>
<td>Estimates of additional building on-site workers and craftsmen needed in the sector by 2020</td>
<td>90 000 (Status quo report page: 106, Tab. 24 column Loss over 2011-2020)</td>
</tr>
<tr>
<td>Number of building on-site workers and craftsmen requiring up-skilling on EE and RES by 2020</td>
<td>54100 (Status quo report page: 106, Tab. 24 column 2020 gap)</td>
</tr>
</tbody>
</table>
| 3-5 occupations with the highest numbers of workers requiring up-skilling on Energy Efficiency and Renewable Energy Sources amongst building on-site workers and craftsmen | • Gypsum plaster board fitters, dry assembly (no wood)  
• Carpenter and fitter of wooden structures  
• Construction carpenter (including wooden structures)  
• Bricklayer PSV: insulation, plaster, stucco  
• Electrician, low voltage distribution (Status quo report page: 121) |
<p>| Number of additional trainers needed | - N/A (Status quo report page: ) |</p>
<table>
<thead>
<tr>
<th>Country Data</th>
<th>Comments + Reference to Status Quo report (page)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Denmark</strong></td>
<td></td>
</tr>
<tr>
<td>Number of building on-site workers and craftsmen (+ data year)</td>
<td>140,000 (Total employed in the building and construction sector) - (1th quarter 2013)</td>
</tr>
<tr>
<td>Number of on-site workers and craftsmen trained per year through Initial education (IVET) (+data year)</td>
<td>5,600 (2011)</td>
</tr>
<tr>
<td>Number of on-site workers and craftsmen trained per year through Continuing education (CVET) (+data year)</td>
<td>2,187 persons participated in public founded energy-related courses (2010)</td>
</tr>
<tr>
<td>Estimates of additional building on-site workers and craftsmen needed in the sector by 2020</td>
<td>Between 3,700 and 13,000 (needed from 2015 in order to achieve the 2020 targets)</td>
</tr>
<tr>
<td>Number of building on-site workers and craftsmen requiring up-skilling on EE and RES by 2020</td>
<td>Between 20,000 and 27,000 workers</td>
</tr>
<tr>
<td>3-5 occupations with the highest numbers of workers requiring up-skilling on Energy Efficiency and Renewable Energy Sources amongst building on-site workers and craftsmen</td>
<td>1) Bricklayers; 2) carpenters/joiners; 3) plumbers/heating air conditioning specialists; 4) electrical installation specialists</td>
</tr>
<tr>
<td>Number of additional trainers needed</td>
<td>There is no needs for additional trainers in Denmark, however a systematic skills upgrading in energy topics for teachers in the adult vocational training system, in addition to the further development of quality assurance of specialist teacher competences in energy topics was recommended in the stakeholder group</td>
</tr>
</tbody>
</table>

Status quo report page: 42 are 169,000 persons. - New figures from February 2013 shows 140,000 persons.)

Status quo report page: this figure is not mentioned in the status quo report)

Status quo report page: 67

Status quo report page: 83

Status quo report page: this figure is not mentioned in the status quo report

Status quo report page: not mentioned in the Status quo report
### Country Data

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<tr>
<th>Estonia</th>
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</thead>
<tbody>
<tr>
<td>Number of building on-site workers and craftsmen (+ data year)</td>
<td>41,000 (2011)</td>
</tr>
<tr>
<td>Number of on-site workers and craftsmen trained per year through Initial education (IVET) (+data year)</td>
<td>900 - 1000 (2011)</td>
</tr>
<tr>
<td>Number of on-site workers and craftsmen trained per year through Continuing education (CVET) (+data year)</td>
<td>990 (2011)</td>
</tr>
<tr>
<td>Estimates of additional building on-site workers and craftsmen needed in the sector by 2020</td>
<td>1300 – 1400 per year</td>
</tr>
<tr>
<td>Number of building on-site workers and craftsmen requiring up-skilling on EE and RES by 2020</td>
<td>10,250 - 12,300</td>
</tr>
<tr>
<td>3-5 occupations with the highest numbers of workers requiring up-skilling on Energy Efficiency and Renewable Energy Sources amongst building on-site workers and craftsmen</td>
<td>1) finishers; 2) general construction workers; 3) heating and ventilation technicians; 4) bricklayers; 5) carpenters</td>
</tr>
<tr>
<td>Number of additional trainers needed</td>
<td>70</td>
</tr>
<tr>
<td><strong>Country Data</strong></td>
<td><strong>Comments + Reference to Status Quo report (page)</strong></td>
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</tr>
<tr>
<td><strong>Finland</strong></td>
<td></td>
</tr>
</tbody>
</table>
| **Number of building on-site workers and craftsmen (+ data year)** | F Construction: 141.762  
F41 Building construction: 48.815  
F42 Earthworks and water: 16.032  
F43 Specialised building operations: 76.915  
(2009)  
(e.g. Please explain if the data refer to the construction sector (F), the building sector (F41) or a refined assessment of the scope “on-site building workers and craftsmen”) |
| **Number of on-site workers and craftsmen trained per year through Initial education (IVET) (+data year)** | Educational institute-type training  
(Qualification earners): 4206  
Apprenticeship training  
(Qualification earners): 556  
(2010)  
(Status quo report page: 33) |
| **Number of on-site workers and craftsmen trained per year through Continuing education (CVET) (+data year)** | N/A  
(Status quo report page: 39) |
| **Estimates of additional building on-site workers and craftsmen needed in the sector by 2020** | 5000 /year; 45 % of the workforce  
(Status quo report page: 53) |
| **Number of building on-site workers and craftsmen requiring up-skilling on EE and RES by 2020** | 141.800 (all)  
(Status quo report page: 66 , 80) |
| **3-5 occupations with the highest numbers of workers requiring up-skilling on Energy Efficiency and Renewable Energy Sources amongst building on-site workers and craftsmen** | 1) building employees; 2) construction sector directors and specialists 3) HPAC installers and 4) Building painters  
(Status quo report page:N/A) |
| **Number of additional trainers needed** | N/A  
(Status quo report page: ) |
<table>
<thead>
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<th>Country Data</th>
<th>Comments + Reference to Status Quo report (page)</th>
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</thead>
<tbody>
<tr>
<td><strong>France</strong></td>
<td></td>
</tr>
<tr>
<td>Number of building on-site workers and craftsmen (+ data year)</td>
<td>On site workers : 634 273 (2010)</td>
</tr>
<tr>
<td></td>
<td>Craftsmen : 321 000 (2010)</td>
</tr>
<tr>
<td></td>
<td>(Status quo report pages 57 +)</td>
</tr>
<tr>
<td>Number of on-site workers and craftsmen trained per year through Initial education (IVET) (+data year)</td>
<td>41 000 (2010)</td>
</tr>
<tr>
<td></td>
<td>(Status quo report page: 81).</td>
</tr>
<tr>
<td>Number of on-site workers and craftsmen trained per year through Continuing education (CVET) (+data year)</td>
<td>70 000 (2010)</td>
</tr>
<tr>
<td></td>
<td>(Status quo report pages : 106, 107)</td>
</tr>
<tr>
<td>Estimates of additional building on-site workers and craftsmen needed in the sector by 2020</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>(Status quo report pages : 130 +)</td>
</tr>
<tr>
<td>Number of building on-site workers and craftsmen requiring up-skilling on EE and RES by 2020</td>
<td>1 million</td>
</tr>
<tr>
<td></td>
<td>(Status quo report pages : 57 +)</td>
</tr>
<tr>
<td>3-5 occupations with the highest numbers of workers requiring up-skilling on Energy Efficiency and Renewable Energy Sources amongst building on-site workers and craftsmen</td>
<td>• Bricklayers</td>
</tr>
<tr>
<td></td>
<td>• Carpenters and wood workers</td>
</tr>
<tr>
<td></td>
<td>• Roofers</td>
</tr>
<tr>
<td></td>
<td>• Painters and plasterers</td>
</tr>
<tr>
<td></td>
<td>(Status quo report pages : 134 / 13)</td>
</tr>
<tr>
<td>Number of additional trainers needed</td>
<td>None – but all the 24 000 trainers have to build up their skills</td>
</tr>
<tr>
<td></td>
<td>(Status quo report page : 139)</td>
</tr>
<tr>
<td>Country Data</td>
<td>Comments + Reference to Status Quo report (page)</td>
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</tr>
<tr>
<td><strong>Germany</strong></td>
<td></td>
</tr>
</tbody>
</table>
| Number of building on-site workers and craftsmen (+ data year) | 2,459,000 (2010)  
The number of 2,459,000 employed persons in the BUS target group 2010 derives from the national microcensus of the German Federal Statistical Office. We had to choose this source because it is the only one where you find data on employees divided by occupations. This method is also very common and is used for example for the occupational projections of the CEDEFOP for the EU. This approach is also necessary, because we cannot take into account all employees on the construction sector F of NACE. There are thousands of office workers and controllers active, which are irrelevant for the renovation process and the necessary qualification. Not all professions that are needed for the energetical refurbishment of buildings are directly associated with the construction sector F of NACE. For example, the metal trades are classified in the area of manufacturing, other professions are classified into different sectors of NACE. Overall, 48.2 percent of the BUS target group is directly attributable to the area F of NACE, the other half comes from other sectors of the NACE. You can see the assignment of jobs to industries in Table 20 of our status-quo-analysis. (Figure 34, page 160) |
| Number of on-site workers and craftsmen trained per year through Initial education (IVET) (+data year) | 65,596 (2011)  
This is the number of new training contracts in construction crafts 2012. The numbers does not include the industry. As an approximate the numbers are acceptable. (Status quo report page: Table 26, last column) |
| Number of on-site workers and craftsmen trained per year through Continuing education (CVET) (+data year) | N.A. (Data year)  
In Germany, there are no statistics for training in the renewable energy and energy efficiency available. An survey on existing CVET programmes, including numbers of participants, was conducted within the project and may give a first idea for the crafts sector (cf. chapter 7.4; and also row 5 in this table) |
| Estimates of additional building on-site workers and craftsmen needed in the sector by 2020 | 90,000  
Our calculations for Germany show that 90,000 additional workers are needed in order to create the additional investments from 2014 on (between 2014 and 2020 EUR 23.6 billion a year of additional investment needs to flow into the refurbishment of residential and non-residential buildings, see page 16 of the status quo report). (Status quo report page: 18, 264, 275, 319) |
<table>
<thead>
<tr>
<th>Number of building on-site workers and craftsmen requiring up-skilling on EE and RES by 2020</th>
<th>low estimate</th>
<th>high estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>39,200 (only CVET for workers)</td>
<td>56,000 (only CVET for workers)</td>
<td></td>
</tr>
<tr>
<td>70,000 (master qualifications)</td>
<td>77,000 (master qualifications)</td>
<td></td>
</tr>
<tr>
<td>368,900 apprentices</td>
<td>385,000 apprentices</td>
<td></td>
</tr>
</tbody>
</table>

The estimates for CVET are based on our survey in the crafts organizations and in parts of the industry (cf. chapter 7.4). There are numerous other training courses done by trade and manufacturers, that we could not cover in this project - so the numbers are very low estimates. Beside this, master qualifications must be considered as a special form of CVET, because master courses are dealing in depth with a wide range of relevant contents of EE and renewables. Due to the structure of the German education system and its high-quality three-year training courses one has to recognize all incoming apprentices in the construction professions, which will also be qualified in EE and RES until 2020.

(Status quo report page: )

<table>
<thead>
<tr>
<th>Number of additional trainers needed</th>
<th>N.A.</th>
<th>N.A.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Because of the German dual educational system (enterprise and school training) no further trainers are necessary.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Status quo report page: )</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3-5 occupations with the highest numbers of workers requiring up-skilling on Energy Efficiency and Renewable Energy Sources amongst building on-site workers and craftsmen</th>
<th>1) Construction, woodworking, plastics manufacture and processing occupations; 2) Electrical occupations; 3) Metal construction, plant construction, sheet metal construction, installation, fitters; 4) technicians; 5) specialist skilled technicians.</th>
<th>N.A.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Due to the data basis which summarises different occupations in occupational fields, single numbers for occupations cannot be given (cf. chapter 7.2).</td>
<td>(Status quo report page: )</td>
</tr>
<tr>
<td>Country Data</td>
<td>Comments + Reference to Status Quo report (page)</td>
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<td></td>
</tr>
<tr>
<td><strong>Greece</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of building on-site workers and craftsmen (+ data year)</td>
<td>109,000 (Data year: 3rd Quarter of 2012)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Employees in the construction sector related to the construction of energy autonomous buildings and the installation of RES systems (estimated as 53% of all workers in the sector, following detailed statistics of previous years) (Status quo report page: 89)</td>
<td></td>
</tr>
<tr>
<td>Number of on-site workers and craftsmen trained per year through Initial education (IVET) (+data year)</td>
<td>Around 4,500 (Data year: 2012)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>This is a number very difficult to be estimated from official data provided by the IVET system. It is only an estimation. (Status quo report page: 89)</td>
<td></td>
</tr>
<tr>
<td>Number of on-site workers and craftsmen trained per year through Continuing education (CVET) (+data year)</td>
<td>Very few, for example ~ 1,200 during 2011-2013 (Data year: 2011-2013)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>There is no systematic procedure to train the on-site workers and craftsmen trained per year through CVET (Status quo report page: 64, 65, 92, 93)</td>
<td></td>
</tr>
<tr>
<td>Estimates of additional building on-site workers and craftsmen needed in the sector by 2020</td>
<td>90,000 (Optimistic scenario) 53,000 (Neutral scenario) 10,000 (Pessimistic scenario)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>First, the trained workforce needed to enter the sector to achieve the national energy targets for 2020 from EE interventions in the existing building stock was calculated. Then, an estimation of the required workforce to enter the sector to meet the needs for construction of new buildings until 2020 was made, according to 3 scenarios simulated. (Status quo report page: 90)</td>
<td></td>
</tr>
<tr>
<td>Number of building on-site workers and craftsmen requiring up-skilling on EE and RES by 2020</td>
<td>From 109,000 (Pessimistic scenario) to 199,000 (Optimistic scenario)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>According to the opinion of the NQP’s members, but also from the analysis made on existing training schemes and courses provided, it was estimated that 100% of the current and future workforce needs specialised training. (Status quo report page: 93, 94)</td>
<td></td>
</tr>
<tr>
<td>3-5 occupations with the highest numbers of workers requiring up-skilling on Energy Efficiency and Renewable Energy Sources amongst building on-site workers and craftsmen</td>
<td>- Electricians and plumbers (being also RES systems installers) - Glaziers and frames installers - Insulation technicians - Heating systems installers - Building frame and related trades workers – most populated group.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>As derived from the responses of the members of NQP in a corresponding question posed to them during the NQP’s Kick-off meeting. Also, according to the evaluation made on the most critical energy related interventions in buildings that will assist in the achievement of the 2020 national targets. (Status quo report page: 94)</td>
<td></td>
</tr>
<tr>
<td>Number of additional trainers needed</td>
<td>From 1,100 (pessimistic scenario to 1,900 (optimistic scenario)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>It was empirically calculated that for every 15 trainees per year one trainer is assigned. Considering a uniform training of workers in the sector within the 7 years remaining until 2020, approximately 1,900 trainers (max) are required. (Status quo report page: 94)</td>
<td></td>
</tr>
<tr>
<td><strong>Country Data</strong></td>
<td><strong>Comments + Reference to Status Quo report (page)</strong></td>
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<td></td>
</tr>
<tr>
<td><strong>Hungary</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Number of building on-site workers and craftsmen (+ data year) | 245,900 (in 2012) out of which:  
- 28,000 hold BSc or MSc;  
- 54,600 hold a high school or equivalent certificate;  
- **131,600** hold a certificate in vocational training;  
- 31,700 have lower education  
This newest data received after the SQR was finalised. Data shows the number of employees in the building sector. |
| Number of on-site workers and craftsmen trained per year through Initial education (IVET) (+data year) | 5133 (2011)  
4464 (2012)  
Graduates in vocational education, by fields of education:  
ISCED 522 - Electricity and energy: 1003  
ISCED 582 - Building and civil engineering: 4130  
| Number of on-site workers and craftsmen trained per year through Continuing education (CVET) (+data year) | 1294 (2011)  
2872 (2012)  
Within the formal school system, number of examinees passing the exam in 2011  
central heating and piping fitter: 310  
bricklayer: 755  
roofer: 27  
business engineer technician: 202  
(Status quo report page: 130, Appendix 7.) |
| Estimates of additional building on-site workers and craftsmen needed in the sector by 2020 | Study shows that depending on the renovation depth of residential and public buildings 8-91,000 additional employees would be needed in the construction sector. Within this 5-43,000 skilled workers are required in 2020.  
Estimation of the 1st roundtable meeting was that 46-70,000 jobs could be created to achieve 2020 targets.  
Hungarian Energy Strategy intends to save 111 PJ energy through building energy programmes, however it is not known how and what type of buildings will be involved. A National Energy Strategy for the Building Sector is currently under development that will specify the exact targets and its implications to the employment needs. Without these targets it was not possible to calculate the need for additional craftsmen therefore the result of a study is displayed here.  
Available also at: www.bush.hu  
(Status Quo Report page: 58) |
| Number of building on-site workers and craftsmen requiring up-skillling on EE and RES by 2020 | 70,000  
This estimation was done by the BUSH consortium experts. |
| 3-5 occupations with the highest numbers of workers requiring up-skillling on Energy Efficiency and Renewable Energy Sources amongst building on-site workers and craftsmen | • fenestration installation technician,  
• building insulation installler,  
• central heating and piping fitter,  
• stonemason,  
• building engineer technician,  
• roofer  
This is resulted from the survey received from 218 building industrial and 29 education & training institutional respondent.  
(Status quo report page: 94) |
| Number of additional trainers needed | no need for additional trainers, the current ones have to be continuously trained to improve their competencies  
The statement resulted from surveys and interviews carried out by BUSH consortium  
(Status quo report page: 100) |
<table>
<thead>
<tr>
<th>Country Data</th>
<th>Ireland</th>
<th>Comments + Reference to Status Quo report (page)</th>
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<tbody>
<tr>
<td>Number of building on-site workers and craftsmen (+ data year)</td>
<td>73,000 (2010)</td>
<td>Total numbers employed in construction related occupations 2010</td>
</tr>
<tr>
<td></td>
<td>56,800 (2010)</td>
<td>Numbers employed in the main building construction related trades 2010</td>
</tr>
<tr>
<td>Number of on-site workers and craftsmen trained per year through Initial education (IVET) (+data year)</td>
<td>582 (2010)</td>
<td>Apprentice intake for construction related trades 2010</td>
</tr>
<tr>
<td>Number of on-site workers and craftsmen trained per year through Continuing education (CVET) (+data year)</td>
<td>599 (2011)</td>
<td>Participation rates on RES installer training 2011</td>
</tr>
<tr>
<td></td>
<td>414 (2011)</td>
<td>Participation rates for domestic gas installer 2011</td>
</tr>
<tr>
<td>Number of building on-site workers and craftsmen requiring up-skilling on EE and RES by 2020</td>
<td>59,000</td>
<td>Total numbers at Operative and Craft level</td>
</tr>
<tr>
<td>3-5 occupations with the highest numbers of workers requiring up-skilling on Energy Efficiency and Renewable Energy Sources amongst building on-site workers and craftsmen</td>
<td>49,000</td>
<td>Carpentry, Bricklaying, Plumbing Plastering &amp; Electrical</td>
</tr>
<tr>
<td>Number of additional trainers needed</td>
<td>100</td>
<td>Based on an assumption of up-skilling existing construction craft trainers</td>
</tr>
<tr>
<td>Country Data</td>
<td>Comments + Reference to Status Quo report (page)</td>
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</tr>
<tr>
<td>Italy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of building on-site workers and craftsmen (+ data year)</td>
<td>The number is related to all the workers in the building sector, that is both plant installers and craftsmen.</td>
<td></td>
</tr>
<tr>
<td>1.847.000 (2011)</td>
<td>(Status quo report page: 87)</td>
<td></td>
</tr>
<tr>
<td>Number of on-site workers and craftsmen trained per year through Initial education (IVET) (+data year)</td>
<td>It has been assumed that about 90% of graduates in technical and professional (about 198,066 units) enter the labour market as blue collar. Approximately 40,061 units join the labor market after primary education and, therefore, are other workforce in the sector. (Status quo report page: 81)</td>
<td></td>
</tr>
<tr>
<td>40.061 (2010)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of on-site workers and craftsmen trained per year through Continuing education (CVET) (+data year)</td>
<td>The continuing education is performed at regional or even provincial level, besides the CVET is carried out both by private company selling products, and by Provinces using FSE and by crafts and industry organizations using other funds such as &quot;Fondimpreza&quot; is therefore impossible to have an estimation.</td>
<td></td>
</tr>
<tr>
<td>Not available</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Estimates of additional building on-site workers and craftsmen needed in the sector by 2020</td>
<td></td>
<td></td>
</tr>
<tr>
<td>99.738</td>
<td>(Status quo report page: 89)</td>
<td></td>
</tr>
<tr>
<td>Number of building on-site workers and craftsmen requiring up-skilling on EE and RES by 2020</td>
<td></td>
<td></td>
</tr>
<tr>
<td>428.000</td>
<td>(Status quo report page: 94)</td>
<td></td>
</tr>
<tr>
<td>3-5 occupations with the highest numbers of workers requiring up-skilling on Energy Efficiency and Renewable Energy Sources amongst building on-site workers and craftsmen</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Masons, electricians, plumbers and heating experts, carpenters</td>
<td>(Status quo report page: 87)</td>
<td></td>
</tr>
<tr>
<td>Number of additional trainers needed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.337</td>
<td>(Status quo report page: 95)</td>
<td></td>
</tr>
<tr>
<td>Country Data</td>
<td>Comments + Reference to Status Quo report (page)</td>
<td></td>
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<tr>
<td>------------------------------------------------------------------------------</td>
<td>-----------------------------------------------</td>
<td></td>
</tr>
<tr>
<td><strong>Latvia</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of building on-site workers and craftsmen (+ data year)</td>
<td>50908 (2011)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>50908 (2011) (Construction sector)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>17940 (F41)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Status quo report page: )</td>
<td></td>
</tr>
<tr>
<td>Number of on-site workers and craftsmen trained per year through Initial education (IVET) (+data year)</td>
<td>812 (2012)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Status quo report page: 47)</td>
<td></td>
</tr>
<tr>
<td>Number of on-site workers and craftsmen trained per year through Continuing education (CVET) (+data year)</td>
<td>No data available (new initiative in Latvia)</td>
<td></td>
</tr>
<tr>
<td>Estimates of additional building on-site workers and craftsmen needed in the sector by 2020</td>
<td>Latvia 2020 scenario: 20 116</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Average growth scenario: 11 063</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Basic scenario: 2 009</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(National Roadmap: 15)</td>
<td></td>
</tr>
<tr>
<td>Number of building on-site workers and craftsmen requiring up-skilling on EE and RES by 2020</td>
<td>Latvia 2020 scenario: 20 116</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Average growth scenario: 11 063</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Basic scenario: 2 009</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(National Roadmap: 15)</td>
<td></td>
</tr>
<tr>
<td>3-5 occupations with the highest numbers of workers requiring up-skilling on Energy Efficiency and Renewable Energy Sources amongst building on-site workers and craftsmen</td>
<td>plasterers - finishing work specialists;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>carpenters, window/door fitters;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>roofers;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Installer - fitters of internal networks, RES (small boilers, solar collectors, PV etc.), HVAC;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(National Roadmap: 15)</td>
<td></td>
</tr>
<tr>
<td>Number of additional trainers needed</td>
<td>Depending on the scenario or the number of trained workers would be needed from 23 to 51 trainers.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(National Roadmap: 40)</td>
<td></td>
</tr>
<tr>
<td><strong>Country Data</strong></td>
<td><strong>Comments + Reference to Status Quo report (page)</strong></td>
<td></td>
</tr>
<tr>
<td>------------------</td>
<td>---------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td><strong>Lithuania</strong></td>
<td>Employed persons by occupational group in construction sector, covering groups of &quot;Skilled workers and craftsmen&quot; and &quot;Unskilled workers&quot;. Values revised according to official data of Labour Market Yearbook (2012) and Database of Indicators of Statistics Lithuania (Status quo report page: 99)</td>
<td></td>
</tr>
<tr>
<td>Number of building on-site workers and craftsmen (+ data year)</td>
<td>89.500 (2012) 97.200 (2013 IIO) (Data year)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Employed persons by occupational group in construction sector, covering groups of &quot;Skilled workers and craftsmen&quot; and &quot;Unskilled workers&quot;. Values revised according to official data of Labour Market Yearbook (2012) and Database of Indicators of Statistics Lithuania (Status quo report page: 99)</td>
<td></td>
</tr>
<tr>
<td>Number of on-site workers and craftsmen trained per year through Initial education (IVET) (+data year)</td>
<td>1268 (2012) * 146 (2012) ** (Data year)</td>
<td></td>
</tr>
</tbody>
</table>
| | No official statistical data  
*The number of trained under the programs associated with energy-efficient buildings (survey results)  
** The number of trained under the programs associated with renewable energy technologies (survey results) (Status quo report page: 73) |
| Number of on-site workers and craftsmen trained per year through Continuing education (CVET) (+data year) | 191 + 65 (2012) * 1578 + 322 (2012) ** (Data year) |
| | No official statistical data  
*Formal continuing training programs  
**Non-formal continuing training programs (Status quo report page: 73) |
| Estimates of additional building on-site workers and craftsmen needed in the sector by 2020 | 15844* |
| | * Revised values of expert assessment using mathematical model (most likely scenario) (Status quo report page: 109) |
| Number of building on-site workers and craftsmen requiring up-skilling on EE and RES by 2020 | 36611* 36608** |
| | *Expert assessment (most likely scenario)  
**Revised values of expert assessment using mathematical model (most likely scenario) (Status quo report page: 104, 105, 109) |
| 3-5 occupations with the highest numbers of workers requiring up-skilling on Energy Efficiency and Renewable Energy Sources amongst building on-site workers and craftsmen | • Engineering equipment installers  
• Concrete workers  
• Joiners, carpenters  
• Facade installers/thermal insulators  
• Bricklayers |
<p>| | Expert assessment of predicted demand of on-site workers to be up-skilled (Status quo report page: 103-104) |
| Number of additional trainers needed | - |
| | No up-to-date official statistical data. No estimate. |</p>
<table>
<thead>
<tr>
<th><strong>Country Data</strong></th>
<th><strong>Comments + Reference to Status Quo report (page)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Luxembourg</em></td>
<td></td>
</tr>
<tr>
<td>Number of on-site workers and craftsmen (+ data year)</td>
<td>40,413 (Data year): 2012 Construction sector (Status quo report page: 67)</td>
</tr>
<tr>
<td>Number of on-site workers and craftsmen trained per year through Initial education (IVET) (+data year)</td>
<td>159 (Data year): 2012 (Status quo report page: 127)</td>
</tr>
<tr>
<td>Number of on-site workers and craftsmen trained per year through Continuing education (CVET) (+data year)</td>
<td>1,341 (Data year): 2012 (Status quo report page: 124)</td>
</tr>
<tr>
<td>Estimates of additional building on-site workers and craftsmen needed in the sector by 2020</td>
<td>14,500 (Status quo report page: 127)</td>
</tr>
<tr>
<td>Number of building on-site workers and craftsmen requiring up-skilling on EE and RES by 2020</td>
<td>13,300 – 15,500 (Status quo report page: 129)</td>
</tr>
<tr>
<td>3-5 occupations with the highest numbers of workers requiring up-skilling on Energy Efficiency and Renewable Energy Sources amongst building on-site workers and craftsmen</td>
<td>Construction (Builder), Electrician, Heating and sanitary, Plasterer – façade specialist (Status quo report page: 129)</td>
</tr>
<tr>
<td>Number of additional trainers needed</td>
<td>- (Status quo report page: -)</td>
</tr>
<tr>
<td>Country Data</td>
<td>Comments + Reference to Status Quo report (page)</td>
</tr>
<tr>
<td>------------------------------------------------------------------------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td><strong>Malta</strong></td>
<td></td>
</tr>
<tr>
<td>Number of building on-site workers and craftsmen (+ data year)</td>
<td>11,099 (2012)</td>
</tr>
<tr>
<td>Number of on-site workers and craftsmen trained per year through Initial education (IVET) (+data year)</td>
<td>161 (2012)</td>
</tr>
<tr>
<td>Number of on-site workers and craftsmen trained per year through Continuing education (CVET) (+data year)</td>
<td>386 (2012)</td>
</tr>
<tr>
<td>Estimates of additional building on-site workers and craftsmen needed in the sector by 2020</td>
<td>Assumed unchanged. Following past building booms further expansion in building industry sector is unlikely.</td>
</tr>
<tr>
<td>Number of building on-site workers and craftsmen requiring up-skilling on EE and RES by 2020</td>
<td>3,664 to 4,885</td>
</tr>
</tbody>
</table>
| 3-5 occupations with the highest numbers of workers requiring up-skilling on Energy Efficiency and Renewable Energy Sources amongst building on-site workers and craftsmen | • Builder/Mason/Heritage Restorer  
• HVAC Technician  
• Construction Technician  
• Building services Technician  
• Plumbing Technician  
• Facilities technician/manager  
• Construction Site Manager |
<p>| Number of additional trainers needed                                         | To be established                                |</p>
<table>
<thead>
<tr>
<th>Country Data</th>
<th>Comments + Reference to Status Quo report (page)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Former Yugoslav Republic of Macedonia</td>
<td></td>
</tr>
</tbody>
</table>
| Number of building on-site workers and craftsmen (+ data year) | 39 000  
Data year: 2011 | (39,000 workers are in building sector  
55,000 workers in the construction sector (formal + informal).  
Status quo report page: 44, 45) |
| Number of on-site workers and craftsmen trained per year through Initial education (IVET) (+data year) | 300  
Data year: 2011 | (Status quo report page: 65) |
| Number of on-site workers and craftsmen trained per year through Continuing education (CVET) (+data year) | 150  
Data year: 2011 | Status quo report page: 55 |
| Estimates of additional building on-site workers and craftsmen needed in the sector by 2020 | 9 600 – 14 400 | Assumption is GDP growth of 3.4% per year in the building sector remains the same. Total number of workers is expected to be 49 000 up to 53 400  
Status quo report page: 44, 47 (detailed) |
| Number of building on-site workers and craftsmen requiring up-skilling on EE and RES by 2020 | 9 800 – 16 000 | Few scenarios were reviewed, but roughly here is detailed data on following pages:  
Status quo report page: 44, 73 |
| 3-5 occupations with the highest numbers of workers requiring up-skilling on Energy Efficiency and Renewable Energy Sources amongst building on-site workers and craftsmen | 1) Bricklayers,  
2) Façade installer-External wall insulation,  
3) Joiners (Glazers),  
4) Carpenters - (roofers) – roof insulation,  
5) Thermal insulation workers – insulation of walls, floors and perimeter | Status quo report page: 47 |
| Number of additional trainers needed | 150 | Roadmap page: 20 |
The Netherlands

<table>
<thead>
<tr>
<th><strong>Country Data</strong></th>
<th><strong>Comments + Reference to Status Quo report (page)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Numbers of trained people in professions directly related to zero-energy buildings and use of renewable energy</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Number of building on-site workers and craftsmen (+ data year)</strong></td>
<td>350,000 (2012)</td>
</tr>
<tr>
<td><strong>Number of on-site workers and craftsmen trained per year through Initial education (IVET) (+data year)</strong></td>
<td>23,000 (2012)</td>
</tr>
<tr>
<td><strong>Number of on-site workers and craftsmen trained per year through Continuing education (CVET) (+data year)</strong></td>
<td>82,000 (2012)</td>
</tr>
<tr>
<td><strong>Estimates of additional building on-site workers and craftsmen needed in the sector by 2020</strong></td>
<td>35,200</td>
</tr>
<tr>
<td><strong>Number of building on-site workers and craftsmen requiring up-skilling on EE and RES by 2020</strong></td>
<td>362,000</td>
</tr>
<tr>
<td><strong>3-5 occupations with the highest numbers of workers requiring up-skilling on Energy Efficiency and Renewable Energy Sources amongst building on-site workers and craftsmen</strong></td>
<td>1) carpenters; 2) mechanics/electrical installations mechanics; 3) plasterers 4) roofers 5) bricklayers</td>
</tr>
<tr>
<td><strong>Number of additional trainers needed</strong></td>
<td>No data available</td>
</tr>
<tr>
<td>Country Data</td>
<td>Comments + Reference to Status Quo report (page)</td>
</tr>
<tr>
<td>------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Norway</strong></td>
<td></td>
</tr>
<tr>
<td>Number of building on-site workers and craftsmen (+ data year)</td>
<td>The number refers to the construction sector Status quo report page: 44 and roadmap page 21.</td>
</tr>
<tr>
<td>100.000 (F) (2012)</td>
<td></td>
</tr>
<tr>
<td>Number of on-site workers and craftsmen trained per year through Initial education (IVET) (+data year)</td>
<td>Status quo report page 38, 39 and 45.</td>
</tr>
<tr>
<td>11.000 (2012)</td>
<td></td>
</tr>
<tr>
<td>Number of on-site workers and craftsmen trained per year through Continuing education (CVET) (+data year)</td>
<td>Only for subject building and civil engineering, and not bordering subject. The figures might somewhat bigger. Estimates from VOX and SSB statistics</td>
</tr>
<tr>
<td>Ca. 2.500 (2012)</td>
<td></td>
</tr>
<tr>
<td>Estimates of additional building on-site workers and craftsmen needed in the sector by 2020</td>
<td>Status quo report page 44.</td>
</tr>
<tr>
<td>Recession: 0</td>
<td></td>
</tr>
<tr>
<td>Status quo: 20.000</td>
<td></td>
</tr>
<tr>
<td>Market growth: 50.000</td>
<td></td>
</tr>
<tr>
<td>Number of building on-site workers and craftsmen requiring up-skilling on EE and RES by 2020</td>
<td>Status quo report page: 54.</td>
</tr>
<tr>
<td>High estimate 50.000</td>
<td></td>
</tr>
<tr>
<td>3-5 occupations with the highest numbers of workers requiring up-skilling on Energy Efficiency and Renewable Energy Sources amongst building on-site workers and craftsmen</td>
<td>Status quo report page: 54.</td>
</tr>
<tr>
<td>60% carpenters, 30% Plumbers, heating and ventilating contractors, electricians</td>
<td></td>
</tr>
<tr>
<td>Number of additional trainers needed</td>
<td></td>
</tr>
<tr>
<td>Depends on the education strategy from the Norwegian Government</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Country Data</td>
<td>Comments + Reference to Status Quo report (page)</td>
</tr>
<tr>
<td>----------------------------------------------------------------------------</td>
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</tr>
<tr>
<td><strong>Portugal</strong></td>
<td></td>
</tr>
<tr>
<td>Number of building on-site workers and craftsmen (+ data year)</td>
<td>100850</td>
</tr>
<tr>
<td>(2009)</td>
<td>This number is for building sector and those occupations related to EE and RES</td>
</tr>
<tr>
<td></td>
<td>(Status quo report page: 33 )</td>
</tr>
<tr>
<td>Number of on-site workers and craftsmen trained per year through Initial</td>
<td>n.a.</td>
</tr>
<tr>
<td>education (IVET) (+data year)</td>
<td>(Data year)</td>
</tr>
<tr>
<td></td>
<td>n.a.</td>
</tr>
<tr>
<td>Number of on-site workers and craftsmen trained per year through Continuing</td>
<td>n.a.</td>
</tr>
<tr>
<td>education (CVET) (+data year)</td>
<td>(Data year)</td>
</tr>
<tr>
<td></td>
<td>n.a.</td>
</tr>
<tr>
<td>Estimates of additional building on-site workers and craftsmen needed in</td>
<td>n.a.</td>
</tr>
<tr>
<td>the sector by 2020</td>
<td>n.a.</td>
</tr>
<tr>
<td>Number of building on-site workers and craftsmen requiring up-skilling on</td>
<td>31200-46400</td>
</tr>
<tr>
<td>EE and RES by 2020</td>
<td>(national roadmap page: 20 )</td>
</tr>
<tr>
<td>3-5 occupations with the highest numbers of workers requiring up-skilling</td>
<td>HVAC installers</td>
</tr>
<tr>
<td>on Energy Efficiency and Renewable Energy Sources amongst building on-site</td>
<td>Solar thermal installers</td>
</tr>
<tr>
<td>workers and craftsmen</td>
<td>Installers of Biomass Boilers and Stoves</td>
</tr>
<tr>
<td></td>
<td>Boiler installers</td>
</tr>
<tr>
<td></td>
<td>Brick layer and insulation workers</td>
</tr>
<tr>
<td>Number of additional trainers needed</td>
<td>n.a.</td>
</tr>
<tr>
<td></td>
<td>n.a.</td>
</tr>
<tr>
<td><strong>Country Data</strong></td>
<td><strong>Comments + Reference to Status Quo report (page)</strong></td>
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<tr>
<td>------------------</td>
<td>-----------------------------------------------------</td>
</tr>
<tr>
<td><strong>Romania</strong></td>
<td></td>
</tr>
<tr>
<td>Number of building on-site workers and craftsmen (+ data year)</td>
<td>207,000 workers (of 331,480 employees in the construction sector) (2011) The data refer to the construction sector and was assessed by statistical inquiry per occupations / professions in CALE project. (Status quo report page: 107, 141)</td>
</tr>
<tr>
<td>Number of on-site workers and craftsmen trained per year through Initial education (IVET) (+data year)</td>
<td>4674 (2008) The figures were assessed based on the reported numbers of graduates of Arts and Crafts, by region, in 2007/2008 in field of Construction, installation and Public Works (Status quo report page: 109)</td>
</tr>
<tr>
<td>Number of on-site workers and craftsmen trained per year through Continuing education (CVET) (+data year)</td>
<td>n/a (Data year) The training of workers and craftsmen is made through various ways and instruments (incl. companies own training program, CVT providers, ESF). The current legislation does not stipulate the functioning of a registry of graduates; the authorization committees have tables with the certified graduates of training programmes, without centralisation at regional or national level. Specific actions were provided in the Roadmap (under Objective 1) to solve this problem. (Status quo report page: n/a)</td>
</tr>
<tr>
<td>Estimates of additional building on-site workers and craftsmen needed in the sector by 2020</td>
<td>44,000 workers The estimation was done within CEDEFOP framework and is based on demographic forecasts and assumptions on the future development of different industrial sectors, taking into account the occupations and qualifications of labour force. (Status quo report page: 108)</td>
</tr>
<tr>
<td>Number of building on-site workers and craftsmen requiring up-skilling on EE and RES by 2020</td>
<td>80,900 to 186,600 workers Low value for pessimistic scenario, High value for optimistic scenario (Status quo report page: 123)</td>
</tr>
<tr>
<td>3-5 occupations with the highest numbers of workers requiring up-skilling on Energy Efficiency and Renewable Energy Sources amongst building on-site workers and craftsmen</td>
<td>- Installers (plumbers and pipe fitters, heating, ventilation, air conditioning) – 10,700 to 23,200 workers - Building and related electrician – up to 6,700 workers - Insulation worker – 21,800 to 49,800 A number of 10 qualifications were selected (grouping more than 20 occupations) with high relevance to energy efficiency and RES system installation in buildings. Low values are for pessimistic scenarios, and high values are for optimistic scenarios.</td>
</tr>
<tr>
<td>Workers</td>
<td>Number of additional trainers needed</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>--------------------------------------</td>
</tr>
<tr>
<td>- Window assembler / Glazier – 390 to 4,700 workers</td>
<td></td>
</tr>
<tr>
<td>- RES systems installer (Solar thermal / photovoltaic, Biomass, Heat pump systems and ground source exchangers) – 880 to 2,940 workers</td>
<td>245 to 630 trainers (for high relevance occupations / qualifications)</td>
</tr>
<tr>
<td>(Status quo report page: 123)</td>
<td>Low value for pessimistic scenario, High value for optimistic scenario</td>
</tr>
<tr>
<td>(Status quo report page: 123)</td>
<td></td>
</tr>
<tr>
<td>Country Data</td>
<td>Comments + Reference to Status Quo report (page)</td>
</tr>
<tr>
<td>--------------</td>
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</tr>
<tr>
<td><strong>Slovakia</strong></td>
<td></td>
</tr>
<tr>
<td>Number of building on-site workers and craftsmen (+ data year)</td>
<td>173,040 (Data year 2011)</td>
</tr>
<tr>
<td>Number of on-site workers and craftsmen trained per year through Initial education (IVET) (+data year)</td>
<td>2,773 (Data year 2008/2009)</td>
</tr>
<tr>
<td>Number of on-site workers and craftsmen trained per year through Continuing education (CVET) (+data year)</td>
<td>11,651 (Data year 2006)</td>
</tr>
<tr>
<td>Estimates of additional building on-site workers and craftsmen needed in the sector by 2020</td>
<td>0</td>
</tr>
<tr>
<td>Number of building on-site workers and craftsmen requiring up-skilling on EE and RES by 2020</td>
<td>47,000</td>
</tr>
<tr>
<td>3-5 occupations with the highest numbers of workers requiring up-skilling on Energy Efficiency and Renewable Energy Sources amongst building on-site workers and craftsmen</td>
<td>Bricklayers + Insulators; Plasterers and dry mounting installers; HVAC installers;</td>
</tr>
<tr>
<td>Number of additional trainers needed</td>
<td></td>
</tr>
<tr>
<td><strong>Country Data</strong></td>
<td><strong>Comments + Reference to Status Quo report (page)</strong></td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------------------------------------------</td>
</tr>
<tr>
<td><strong>Slovenia</strong></td>
<td></td>
</tr>
<tr>
<td>Number of building on-site workers and craftsmen (+ data year)</td>
<td>(Data year) 2012</td>
</tr>
<tr>
<td>Number of on-site workers and craftsmen trained per year through Initial education (IVET) (+data year)</td>
<td>(Data year) 2011</td>
</tr>
<tr>
<td>Number of on-site workers and craftsmen trained per year through Continuing education (CVET) (+data year)</td>
<td>(Data year) 2012</td>
</tr>
<tr>
<td>Estimates of additional building on-site workers and craftsmen needed in the sector by 2020</td>
<td>(Data year) 2012</td>
</tr>
<tr>
<td>Number of building on-site workers and craftsmen requiring up-skilling on EE and RES by 2020</td>
<td></td>
</tr>
<tr>
<td>3-5 occupations with the highest numbers of workers requiring up-skilling on Energy Efficiency and Renewable Energy Sources amongst building on-site workers and craftsmen</td>
<td></td>
</tr>
<tr>
<td>Number of additional trainers needed</td>
<td></td>
</tr>
<tr>
<td><strong>Country Data</strong></td>
<td><strong>Comments + Reference to Status Quo report (page)</strong></td>
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<tr>
<td><strong>Spain</strong></td>
<td></td>
</tr>
<tr>
<td>Number of building on-site workers and craftsmen (+ data year)</td>
<td>905,644 (June 2012)</td>
</tr>
<tr>
<td>NACE CODES CONSIDERED: 41.21 Construction of residential buildings; 41.22 Construction of non-residential buildings; 43.11 Demolition; 43.21 Electrical installations; 43.22 Plumbing, heating systems and air conditioning installations; 43.29 Other facilities at construction sites; 43.31 Plastering; 43.32 Carpentry installation; 43.33 Floor and wall covering; 43.34 Painting and glazing; 43.39 Other building completion; 43.91 Roofing</td>
<td></td>
</tr>
<tr>
<td>Number of on-site workers and craftsmen trained per year through Initial education (IVET) (+data year)</td>
<td>7,164 (2009 – 2010)</td>
</tr>
<tr>
<td>Number of on-site workers and craftsmen trained per year through Continuing education (CVET) (+data year)</td>
<td>7,500 (2007-2011)</td>
</tr>
<tr>
<td>Estimates of additional building on-site workers and craftsmen needed in the sector by 2020</td>
<td>166,445</td>
</tr>
<tr>
<td>Number of building on-site workers and craftsmen requiring up-skilling on EE and RES by 2020</td>
<td>28,419 (low scenario) 60,858 (high scenario)</td>
</tr>
<tr>
<td>3-5 occupations with the highest numbers of workers requiring up-skilling on Energy Efficiency and Renewable Energy Sources amongst building on-site workers and craftsmen</td>
<td>1) Joint sealant operator; 2) Assembler of aluminium and PVC carpentry; 3) Mason and Bricklayer; 4) Installer of solar thermal systems; 5) Installer of geothermal systems; 6) Installer of biomass systems;</td>
</tr>
<tr>
<td>Number of additional trainers needed</td>
<td>1,063 (low scenario) 2,685 (high scenario)</td>
</tr>
</tbody>
</table>

(Roadmap page: 45) (Roadmap page: 48) (Status quo report page: 86) (Roadmap page: 48)
<table>
<thead>
<tr>
<th><strong>Country Data</strong></th>
<th><strong>Comments + Reference to Status Quo report (page)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sweden</strong></td>
<td></td>
</tr>
<tr>
<td>Number of building on-site workers and craftsmen (+ data year)</td>
<td>305 000, year 2010</td>
</tr>
<tr>
<td>Number of on-site workers and craftsmen trained per year through Initial education (IVET) (+data year)</td>
<td>Building programme: 16 000 Electrical programme: 22 521 Energy Programme: 4 191 year 2010-2011</td>
</tr>
<tr>
<td>Number of on-site workers and craftsmen trained per year through Continuing education (CVET) (+data year)</td>
<td>Not available</td>
</tr>
<tr>
<td>Estimates of additional building on-site workers and craftsmen needed in the sector by 2020</td>
<td>125 000 (25 000 construction workers/year)</td>
</tr>
<tr>
<td>Number of building on-site workers and craftsmen requiring up-skilling on EE and RES by 2020</td>
<td>100 000</td>
</tr>
<tr>
<td>3-5 occupations with the highest numbers of workers requiring up-skilling on Energy Efficiency and Renewable Energy Sources amongst building on-site workers and craftsmen</td>
<td>1) construction woodworkers, carpenters; 2) installation electricians and fitters; 3) HVAC technicians 4) ventilation fitters and 5) bricklayers</td>
</tr>
<tr>
<td>Number of additional trainers needed</td>
<td>500 on-site trainers 1500 teachers in upper secondary school need further skills enhancement</td>
</tr>
<tr>
<td>Country Data</td>
<td>Comments + Reference to Status Quo report (page)</td>
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<td>----------------------------------------------------------------------------</td>
<td>-----------------------------------------------</td>
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<tr>
<td>United Kingdom</td>
<td></td>
</tr>
<tr>
<td>Number of building on-site workers and craftsmen (+ data year)</td>
<td>1,355,000 (2011)</td>
</tr>
<tr>
<td>Number of on-site workers and craftsmen trained per year through Initial education (IVET) (+data year)</td>
<td>No available data</td>
</tr>
<tr>
<td>Number of on-site workers and craftsmen trained per year through Continuing education (CVET) (+data year)</td>
<td>249,136 (2010)</td>
</tr>
<tr>
<td>Estimates of additional building on-site workers and craftsmen needed in the sector by 2020</td>
<td>100,607</td>
</tr>
<tr>
<td>Number of building on-site workers and craftsmen requiring up-skilling on EE and RES by 2020</td>
<td>252,520</td>
</tr>
<tr>
<td>3-5 occupations with the highest numbers of workers requiring up-skilling on Energy Efficiency and Renewable Energy Sources amongst building on-site workers and craftsmen</td>
<td>1) construction and building trades; 2) plumbers; 3) electricians and electrical fitters; 4) carpenters and joiners; 5) construction operatives.</td>
</tr>
<tr>
<td>Number of additional trainers needed</td>
<td>500 - 700</td>
</tr>
</tbody>
</table>