European Commission

European Construction Sector Observatory

Improving the human capital basis

Analytical Report

March 2020

DISCLAIMER

The information and views set out in this Analytical Report are those of the authors and do not necessarily reflect the official opinion of the European Commission. The Commission does not guarantee the accuracy of the data included in this Analytical Report. Neither the Commission nor any person acting on the Commission's behalf may be held responsible for the use which may be made of the information contained therein.

Table of Contents

Table of Figures

Table of Tables

Table of Boxes

Executive Summary

This is an updated version of the Analytical Report "Improving the human capital basis" published in 2017. Based on both statistical data and policy analysis, it provides insights and lessons learnt related to the workforce in the construction sector.

The data collection for this report was performed before January 2020, before Brexit went into effect. Therefore, this report refers to EU as EU-28 and the United Kingdom is considered as a part of European Union.

This Analytical Report was drafted prior to COVID-19 pandemic in the EU. Therefore, this Analytical Report does not include the reflection or the analysis of the impacts of COVID-19 on the construction sector and related skill needs.

Chapter 1 ("Introduction") raises the issue of the human capital in the construction sector, taking recent policy developments in account, and highlighting some of the key issues, including skill shortages. Chapter 2 ("Workforce and skills in construction") presents the general demographic developments in the European Union (EU) and in the construction sector, underlining trends such as an ageing population and a shrinking labour force. It also analyses the current state of skill needs and vacancies. Chapter 3 ("Drivers of skill acquisitions") focuses on the main driving force for skill updates including, inter alia, market trends and policies on energy and resource efficiency, occupational safety and health (OSH), digitalisation, and a broader upskilling movement.

Chapter 4 ("Obstacles to skill development") presents the key factors that impede skill development in the construction sector, discussing the situational and structural barrier factors, the negative image of the sector, the often-suboptimal vocational education and training (VET) as well as future and persistent challenges in skill recognition in construction. Chapter 5 ("Policy initiatives") presents some policy initiatives led by policy-makers and the industry alike to address the issue of skill development in the construction sector. In doing so, it provides an overview of national policy responses to the main drivers and obstacles identified. Lastly, Chapter 6 ("Lessons learnt") summarises the obstacles identified in this report and policy options to support the development of skills in the construction sector.

Workforce and skills in construction

The demographic trends across the EU are characterised by lower birth rates, increasing life expectancy and a shrinking proportion of the working-age population. Such demographic changes are influenced, not only by internal changes in the structure of population, but also by increasing migration and mobility trends.

Declared migration and mobility movements across the EU accounted for an inflow between 2 and 4.5 million individuals per year (including both extra and intra community movements).

EU's working-age population is expected to decline each year until 2060. This is particularly the case in Lithuania, Bulgaria, Latvia, Croatia and Romania, in which working-age populations are expected to experience the sharpest declines in the coming decades across the EU, partly driven also by mobility of their workforce within the EU. On the other side of the spectrum, Luxembourg, Malta, Sweden and Cyprus' working-age populations are expected to grow in the years to come.

The sum of persons employed in the construction sector in Germany, United Kingdom, France, Italy and Spain accounted for 61.5% of the total workforce of the EU construction sector in 2017.

Across the EU, the top three construction-related occupations in 2017 were construction workers, science and engineering technicians and electro engineering workers. At the same time, a growing share of high-tech

occupations was recorded across the EU in 2018. It is estimated that, by 2030, the employment in the EU construction sector will increase by 4.3%. This growth, however, will vary across EU Member States (MS). While Romania, Estonia, Germany and Latvia construction sectors are expected to experience a decrease in terms of employment by 2030, it is in France, Malta, Ireland and Cyprus that such a decrease will be most significant.

According to the European Centre for the Development of Vocational Training (CEDEFOP), about 1 million new and replacement workers will be needed by 2025[1]. Additionally, the skills needed in construction are likely to change to meet the demands for "green" and energy-efficient buildings.

The growing necessity for a workforce in the construction sector translated into an increasing number of available vacancies. Between 2010 and 2018, the Czech Republic and Slovenia recorded the largest increase in the share of vacancies to the amount of people employed in the sector (621.9% and 411.7% respectively).

While the number of job vacancies in the sector has grown dramatically in recent years, tertiary education and VET have not kept pace with the existing demand.

The participation of adults in education and training in the construction sector remained static over the 2010-2017 period. The largest increase in the number of tertiary education graduations is seen in Luxembourg, Cyprus and Germany. Skills needed in construction are likely to move towards "green", energy efficiency (EE) and digitalisation trends, that follow new designs and use new materials. The demand for people with high-level qualifications is expected to double, to account for one third of all jobs in construction by 2025.

Drivers of skill acquisition

Resource efficiency, digitalisation and OSH are some of the most influential drivers for skill acquisition in Europe.

The main EU policies, regulations and instruments that frame EU's sustainable development and EE affect the European construction sector and its skill needs and demands.

The newly adopted European Green Deal aims to activate the education and training system to support the transition to a green economy. From 2021 to 2027, the Green Deal will focus on the development of the European competence framework with a EUR 3 billion investment into school infrastructure and the creation of the European Social Fund+ will support re-skilling and upskilling of the workforce. In addition to the European Green Deal, the European Commission published in 2020 five communications, which are likely to have an impact on skills development in Europe, namely: i) A New Industrial Strategy for Europe; ii) A SME strategy for a sustainable and digital Europe; iii) Long-term action plan for better implementation and enforcement of single market rules; iv) Identifying and addressing barriers to the Single Market; and v) A new Circular Economy Action Plan. Last but not least, an Updated Skills Agenda for Europe is expected to be launched later on in 2020.

Additionally, by setting ambitious EE goals for Europe, the Energy Efficiency and the Energy Performance of Building Directives drive the needs for additional skills in green energy and energy efficient construction.

3 to 4 million construction workers in Europe will need to develop their EE related skills in the building sector.

The renewable energy industry has contributed to the creation of 1.2 million jobs in Europe so far and is expected to employ up to 2 million people by the end of 2020, with most new jobs being created in the

[1] CEDEFOP skills forecast, 2016

construction sector. Several policy initiatives have been developed in Europe to upgrade and/or set up large-scale qualification and training schemes to meet the expected demand of the near future. The BUILD UP Skills initiative is a frontrunner in energy efficient construction skills and plays a key role in this process.

Developments in OSH in construction have an impact on i) the attractiveness of the sector; ii) the retention of the older workforce and; iii) the increasing need for OSH related skills.

75% of construction companies struggle to follow OSH requirements and 40% of construction employees do not work safely. To address this issue, OSH-related training for the construction sector must increase by 60%.

In order to tackle these challenges, in 2018, the European Commission (EC) launched the Blueprint for Sectoral Cooperation on Skills for the Construction sector, which also includes OSH as one of the key areas for skill development. The analysis of current and anticipated OSH skill needs in the construction sector is expected to contribute to i) revising OSH occupational profiles and professional qualifications, ii) identifying good practices at regional and national levels, iii) developing an OSH training proposal adapted to the new needs for "green" profiles, and iv) creating a more favourable image of the sector that proactively addresses OSH issues.

Upskilling the workforce in the construction sector is one of the main challenges of the sector: how to update and align the qualifications and skills of the workforce to new technologies and digitalisation? Upskilling towards EE, innovation and safety must be considered throughout the entire value chain of the construction sector, e.g. designers, architects, engineers and workers.

According to an evaluation of the BUILD UP Skills initiative, 3 to 4 million blue collar workers will need upskilling in the field of EE alone.

Standardisation and building industrialisation are some of the drivers for new skills in the sector. Offsite construction is increasingly technology-driven, relying on approaches and tools such as Design for Manufacture and Assembly (DFMA), Lean production, Building Information Modelling (BIM) and BIM-related Enterprise Resource Planning tools. Managerial and technical skills will need to be increasingly intertwined, especially in higher level occupations. Construction professionals of the future will be characterised by a balance of core soft and technical skills, as well as relevant knowledge and evolving behaviours.

Where offsite factories are built, there will be an increase in new employment opportunities for skilled trades, as well as the creation of new apprenticeships.

While skill shortage is often linked to the emergence of new technologies and/or processes in the construction sector, much less attention is paid to the loss of traditional skills. Without such a set of skills it could notably impact the management, protection and conservation of historic and cultural heritage, which, consequently, generates direct and indirect income and provides jobs.

Obstacles to skill development

Three types of factors, in particular, affect the skill development in the construction sector. The first refers to situational barriers such as an ageing population or the slow digital transformation of the construction sector. The second consists of structural barriers that include, for instance, the fragmentation of the market and the construction of value chains, as well as the uncertainties of the construction sector's development. Last, the construction sector is subject to cyclical factors, which make skill development more difficult to achieve.

Due to the lower predictability of the construction sector, many companies adopts a temporary employment model to their staffing strategy, limiting the incentives for long-term investment in the workforce.

In addition to these factors, initiatives to upskill construction workers, such as training workshops, are often challenged by a lack of public support, limited availability, as well as the uncertainty over the quality of the training. For migrant workers, cultural and linguistic barriers may also pose a difficulty to attend and complete training workshops successfully. Plus, the cost of training is often considered too high for small construction companies.

The construction sector also suffers from an overall poor image associated with low job security, tough working conditions and health and safety concerns. Studies find that the construction sector has become synonymous with low-quality work and low health and safety levels.

A lot of creative construction-related professions are often overlooked, such as jobs in architecture and design. Young people, and especially women, rarely view the construction sector as a potential and attractive employer.

VET is key for skill development in the construction sector. While the alignment of the VET system with the needs of the market is crucial for its overall efficiency and effectiveness, the continuous collaboration between public and private sector actors is often too limited. Adult learning programmes can be effective in upskilling and reskilling people, especially when combined with on-the-job training. On-the-job trainings, however, need to target professionals adequately and meet required quality objectives. Apprenticeships, like VET, are lacking quality and accessibility across the EU. Apprenticeships in the construction sector have several specific features, compared with other sectors:

1. Availability of training funding;
2. Remuneration for apprentices tends to be regulated;
3. Stricter requirements for companies providing apprenticeships;
4. Stricter OSH requirements;
5. Frequent use of a formal contract;
6. Large share of practical training compared to theoretical learning.

As of 2015 the construction sector participated in the European Alliance for Apprenticeships[2] (EAfA) initiative, which aims to strengthen the quality, supply, mobility and the image of apprenticeships across Europe.

Mobility of skilled workers from areas of low demand to areas of higher demand can contribute to alleviating skill shortages in the EU.

In the EU context, Professional Qualifications Directive (PQD) is the main instrument for recognition of professional qualifications, while the European Qualifications Framework (EQF) and the European Credit system for Vocational Education and Training (ECVET) are the two main instruments to facilitate the academic recognition of qualifications across EU MS.

To reform and simplify the related administrative procedures, the Professional Qualifications Directive (PQD) aims to increase the flexibility of the labour market and the liberalisation of the provision of services, promoting automatic recognition of professional qualifications in EU countries. The Services Directive complements the PQD by removing legal and administrative barriers to trade through simplification measures to increase transparency and facilitate the provision of, and access to, cross-border services. Finally, the European Professional Card (EPC) in some cases eases the recognition of selected professional qualifications within the EU. However, when put into practice, sometimes MS regulations might pose additional requirements for specific professions, impeding workers' mobility.

[2] EAfA website available at https://ec.europa.eu/growth/sectors/construction/apprenticeships_en

Policy initiatives

EU MS have developed policy instruments to tackle the construction sector's skill-related issues, through broad or specific training schemes. In some instances, policy initiatives aim to improve the image of the construction sector and attract young workers by supporting the development of digital skills, incentivising apprenticeships and improving the quality of VET.

The implementation of skill policies often follows a multi stakeholder approach, combining governments, construction companies, associations, VET providers and, in some cases, academia.

This Analytical Report summarises the key trends in skill-related policies in the construction sector in Europe:

- Policy initiatives addressing the issue of skill development mostly include construction strategies, dedicated training institutions and horizontal programmes;
- There are increasing trends in advancing training and skill development programmes focusing on specific problematic areas. EE has gained prominence in most of MS, with the number of initiatives increasing over the last three years;
- EE initiatives are greatly supported by the EU co-funded BUILD UP Skills programme, which is present in all EU MS. This programme plays a key role in upgrading the skills of workers in the construction sector;
- Most EU MS have made dedicated efforts to supporting digitalisation and digital skills in the construction sector;
- Only a limited number of MS have implemented dedicated initiatives to apprenticeships in the construction sector;
- Most of the EU MS are reforming their VET to update curricula and provide workers with the latest set of knowledge and skills needed; and increase collaboration with the construction sector to align education and trainings with labour market needs;
- Over half of the EU MS have introduced initiatives aiming at improving the image of construction, which in most cases target young people, and increasingly women;
- Efforts for skill recognition have evolved in recent years and are no longer revolving only around the implementation of the skill cards.

Lessons learnt

To overcome the obstacles to skills development highlighted in this report (e.g. suboptimal vocational education, skill recognition, the negative image of the sector etc.) and take full advantage of the opportunities, the insights regarding three main policy areas should be considered:

1. **Vocational Education and Training**

   a) Reinforce the cooperation between educational institutions and the industry to improve the quality of training
   b) Increase the availability and quality of apprenticeships
   c) Development of more tangible goals for the national strategies and action plans for construction sector
   d) Focus on training the trainers.

2. **Upskilling and re-skilling of workers**

   e) Develop and integrate upskilling frameworks at the national and sector level
   f) Favour more flexible and innovative types of training
   g) Ensure the new skills of construction workers, obtained through VET, apprenticeship or irregular on-the-job training are recognised by national authorities.

3. Horizontal measures

a) Policy makers should support the upskilling awareness raising campaigns including among businesses to support competitiveness of the sector

b) Design sustainable training programmes to ensure their relevance, efficiency and uptake.

List of abbreviations

AI	Artificial intelligence
BIM	Building Information Modelling
BYN	Swedish Construction Industry Training Board
CEDEFOP	European Centre for the Development of Vocational Training
CIRI	Construction Industry Register Ireland
CPI	Institute of the Republic of Slovenia for Vocational Education and Training
CVs	Curriculum Vitae
DFMA	Design for Manufacture and Assembly
EAfA	European Alliance for Apprenticeships
EAFRD	European Agricultural Fund for Rural Development
EaSI	Employment and Social Innovation
EASME	Executive Agency for Small and Medium-sized Enterprises
EC	European Commission
ECVET	European credit system for vocational education and training
EE	Energy efficiency
EED	Energy Efficiency Directive
EGF	European Globalisation Adjustment Fund
EFTA	European Free Trade Association
EIGE	European Institute for Gender Equality
EPBD	Energy Performance of Buildings Directive
EPC	European Professional Card
EQAVET	European quality assurance in vocational education and training
EQF	European qualifications framework
ERDF	European Regional Development Fund
ESCO	European skills, competences, qualifications and occupations
ESF	European Social Fund
EU	European Union
EUC Syd	Danish local Vocational Education Centre South
FEAD	Fund for European Aid to the Most Deprived
FIEC	European Construction Industry Federation
GDP	Gross Domestic Product
GHG	Greenhouse gas
HVAC	Heating, ventilation, and air conditioning
ICT	Information Communication and Technology
IFC	Industry Foundation Classes
IMF	International Monetary Fund
ISHCCO	International Safety and Health Construction Coordinators Organization
MFF	Multiannual Financial Framework
MMCs	Modern Methods of Construction
MS	Member States
NEEAP	National Energy Efficiency Action Plans
nZEBs	Nearly Zero Energy Buildings
OECD	Organisation for Economic Co-operation and Development
OSH	Occupational Safety and Health
PQD	Professional Qualifications Directive
PTNB	Building Digital Transition Plan
R&D	Research and Development
RES	Renewable Energy Sources

RICS	Royal Institution of Chartered Surveyors
RKL	Finnish Construction Managers and Engineers
SDGs	Sustainable Development Goals
SMEs	Small and medium size enterprises
TO	Thematic objective
UMR	Unaccompanied minor refugees
VET	Vocational Education and Training

1. Introduction

In the light of technological development, demographic and climate change and globalisation, the world of work is changing. The trend of automation replacing labour, ageing population and migration and mobility alongside the transition towards sustainable economic growth is reshaping the future of work and altering the need for skills. The United Nations Sustainable Development Goals (SDGs) reflect these developments, setting out a 2030 agenda, which lays out strategic fields of action "for people, planet and prosperity"[3]. Among these strategic priorities identified is the need for improvement of the skill base. One of the SDGs (Goal four) encompasses life-long learning, equal access to technical, vocational and tertiary education and relevant skills: "By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship"[4]. The goal defines the acquisition of affordable and quality skills as a stepping stone towards a more equitable, prosperous and sustainable world.

General EU policy context

The relationship between skill acquisition, decent work, economic growth and quality of life is translated in the policy agenda of the European Union (EU), relevant to improving the human capital basis growth, as apparent in regulations and strategies paving the way forward. The first principle of the European Pillar of Social Rights published in 2017 identifies education, training and life-long learning as indispensable in delivering equal opportunities and access to the labour market for all European citizens. It says that "everyone has the right to quality and inclusive education, training and life-long learning in order to maintain and acquire skills that enable people to participate fully in society and successfully manage transitions in the labour market"[5].

In 2019, the European Green Deal was set up as the main European strategy to address climate challenges. It aims to "transform the EU into a fair and prosperous society, with a modern, resource-efficient and competitive economy where there are no net emissions of greenhouse gases by 2050 and where economic growth is decoupled from resource use". To reach this goal, among other activities, the European Green Deal focuses on activation of the education and training system. This includes three main streams of activities:

1. **development of the European competence framework to help develop and assess knowledge, skills and attitudes on climate change and sustainable development;**
2. **leverage EUR 3 billion of investment in the school infrastructure in 2020 to make school buildings and operations more sustainable;**
3. **create the European Social Fund+ to support re-skilling and upskilling of the workforce needed to transfer from declining sectors to growing sectors and to adapt to new processes[6].**

[3] United Nations. Transforming Our World. The 2030 Agenda for Sustainable Development, 2015, https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf

[4] Ibidem.

[5] European Commission, European Pillar of Social Rights, 2017. https://ec.europa.eu/commission/priorities/deeper-and-fairer-economic-and-monetary-union/european-pillar-social-rights/european-pillar-social-rights-20-principles_en

[6] European Commission, The European Green Deal, Communication from the Commission to The European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions. December 2019. https://ec.europa.eu/info/sites/info/files/european-green-deal-communication_en.pdf

In addition to the European Green Deal, the European Commission launched in 2020 five communications that will affect the development and/or recognition of skills in the EU. First, "A New Industrial Strategy for Europe"[7] includes skilling and reskilling as one of the key fundamental factors in making Europe's industrial twin transformation happen, with over 120 million European workers having to reskill or upskill within the next five years. Second, the EC Communication on "An SME Strategy for a sustainable and digital Europe"[8] also identifies the shortage of skills as key a barrier preventing SMEs to grow, especially regarding the availability of skilled staff and managers, as well as those with digital and new technologies skills. Importantly, the two Communications aforementioned evoke the launch of the new "Pact for Skills" (which will be detailed in the planned Updated Skills Agenda for Europe), a collective action that will contribute to up- and reskilling and to unlock public and private investment in the workforce. It will notably include a dedicated component dedicated to SMEs "Identifying and addressing barriers to the Single Market"[9] also highlight that skill shortages hinder the integration of the single market, by preventing businesses one Member State to expand and establish themselves across border. Fourth, the EC launched its "Long term action plan for better implementation and enforcement of single market rules"[10]. In this Communication, the EC states its intention to publish updated reform recommendations for regulation of professional services on the basis of the Commission Communication of 17 January 2017, with a view foster "*workers' mobility and reducing skills shortages and mismatch, notably in the context of the green and digital transitions*". Fifth, A new Circular Economy Action Plan[11] announced launching of a new comprehensive Strategy for a Sustainable Built Environment, which will focus also on skills.

In fact, the EC reiterated the importance of skill acquisition and signalled its further support. The mission letter to the Commissioner for jobs outlines the commitment to strengthening Europe's social dimension, defining the task as the underlying fundamental European values of dignity, fairness and prosperity. In particular, the new mission for this Commissioner will be, among others, to lead the way in implementing and updating the EU Skills Agenda, with a focus on tackling skill shortages and promoting reskilling, supporting "individual learning accounts for people of working-age, enabling adults to accumulate training entitlements and use them for quality-assured training"[12]. Investing in skill development and acquisition has emerged as a focal point of future-proofing European economies. With the New Skills Agenda for Europe[13], launched in 2016, the role of skills becomes entangled with the delivery of the core mission of the EU, as defined in Article 3 of the Treaty on European Union – achieving full employment and social progress[14,15].

The forthcoming Updated Skills Agenda for Europe will have a further emphasis on improving the business environment, in terms of matching skills to those sought by businesses, improving skills intelligence and increasing their visibility and transparency across borders. According to the recent EC communication on the identifying and addressing barriers to the Single Market[16], the forthcoming European Pact on Migration and Asylum will specify the approach to legal migration management in order for the EU to better attract the

7 European Commission, A New Industrial Strategy for Europe, 2020. https://ec.europa.eu/info/sites/info/files/communication-eu-industrial-strategy-march-2020_en.pdf

8 European Commission, An SME Strategy for a sustainable and digital Europe, 2020. https://ec.europa.eu/info/sites/info/files/communication-sme-strategy-march-2020_en.pdf

9 European Commission, Identifying and addressing barriers to the Single Market, 2020. https://ec.europa.eu/info/sites/info/files/communication-eu-single-market-barriers-march-2020_en.pdf

10 European Commission, Long term action plan for better implementation and enforcement of single market rules, 2020. https://ec.europa.eu/info/sites/info/files/communication-enforcement-implementation-single-market-rules_en_0.pdf

11 European Commission, A new Circular Economy Action Plan, 2020. https://ec.europa.eu/environment/circular-economy/index_en.htm

12 European Commission, Mission letter to Nicolas Schmit, https://ec.europa.eu/commission/sites/beta-political/files/mission-letter-nicolas-schmit_en.pdf

13 European Commission, New Skills Agenda for Europe, 2016. https://ec.europa.eu/social/main.jsp?catId=1223

14 European Commission, Council Recommendation on Upskilling Pathways: New Opportunities for Adults Taking stock of implementation measures, 2019. https://ec.europa.eu/info/sites/info/files/file_import/implementation-report-upskilling-pathways_en.pdf

15 European Commission. Consolidated version of the Treaty on European Union, 2012. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A12012M%2FTXT

16 European Commission, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on Identifying and addressing barriers to the Single Market. March 2020, https://ec.europa.eu/info/sites/info/files/communication-eu-single-market-barriers-march-2020_en.pdf

skills and talents that the EU labour market needs. Relaunching and concluding swiftly the negotiations of the Blue Card Directive to attract highly skilled workers will remain a priority for the EU.

These policy commitments come at a time of low unemployment in the EU. In September 2019, the unemployment rate reached 6.3% - the lowest ever recorded in the EU[17,18]. Compared to the economic boom before the financial crisis, 10 million more people are employed in 2019, a decade later. While demand for labour remains high, in 2018 14.1% of jobs in the EU were temporary[19,20] associated with higher uncertainty and less social guarantees. At the same time, economic forecasts point to a slowdown in growth, amidst global economic events, such as trade tensions between large economies. The situation on the labour market is paired with the unprecedented rapid emergence of new technologies, disrupting the way people work and live. Technological change, among other factors, is contributing to a mismatch between the demand and supply of skills and competences. The Future of Knowledge 2019 report warns that in the "absence of comprehensive re/upskilling and training opportunities", even well-developed economies risk stagnation and potential decline in the near future[21].

Skill availability as a challenge for the construction sector

The labour market in Europe is increasingly defined by two general characteristics. First, demand for labour is skewed towards high-skilled workers with tertiary education. According to the European Centre for the Development of Vocational Training (CEDEFOP) by 2025 about 48% of all job opportunities in Europe will need to be filled by individuals with tertiary-level qualifications, while 85% of all EU jobs need at least a basic digital skill level[22]. Second, although the employment rate has been rising in recent years, employers have difficulty filling positions with workers who have the right skills, and in turn impedes further investments and business growth. On average since 2016, 77% of firms report limited availability of skills as a barrier to investment[23].

Moreover, while estimates of the share of jobs that could be potentially automated vary, consensus exists that the effects of automation will be massive. Globally, 60% of occupations include over a third of activities, which are automatable[24]. In the EU, between 37% and 69% of all jobs could be partly automated, affecting up to 60% of workers in Europe by 2030[25,26]. This development is exacerbating the existing skill mismatch, showing that, unless counteracted, the skill gap will only expand in the future.

This situation largely affects the **European construction sector**. While the sector's talent pool is shrinking with ageing workers retiring and young people reluctant to consider construction as their career choice, it is also faced with further challenges of adapting and upgrading the skills and abilities of the current working-age labour force. Rising awareness of the challenges related to the planet's changing climate require a large-scale shift in political, economic and individual daily action and behaviour. The European Construction

17 Eurostat, Unemployment statistics, https://ec.europa.eu/eurostat/statistics-explained/index.php/Unemployment_statistics
18 DW, Europe's unemployment rate hits historic lows, https://www.dw.com/en/europes-unemployment-rate-hits-historic-lows/a-49827207
19 WSJ, Europe's New Jobs Lack Old Guarantees—Stoking Workers' Discontent, https://www.wsj.com/articles/europe-is-adding-jobs-at-the-expense-of-job-securityand-workers-are-fuming-11574020704
20 European Commission, Temporary employment: 14.1% of employees https://ec.europa.eu/eurostat/web/products-eurostat-news/-/DDN-20190524-1?fbclid=IwAR08OD-TJYaylBYAxHU-1pQ5s1yyU3QbJH2pDvoYoyp9VYap-e69YNnng10
21 UNDP, MBRM Knowledge Foundation, The Future of Knowledge: A Foresight Report, 2019. http://knowledge4all.com/reports/futureofknowledge2019_en.pdf
22 CEDEFOP, Insights into skill shortages and skill mismatch, Learning from CEDEFOP's European skills and jobs survey, 2018. https://www.CEDEFOP.europa.eu/files/3075_en.pdf
23 EIB, Skill shortages and skill mismatch in Europe: A review of the literature, 2019. https://www.eib.org/attachments/efs/economics_working_paper_2019_05_en.pdf
24 McKinsey Global Institute, Jobs lost, jobs gained: What the future of work will mean for jobs, skills, and wages, 2017. https://www.mckinsey.com/featured-insights/future-of-work/jobs-lost-jobs-gained-what-the-future-of-work-will-mean-for-jobs-skills-and-wages
25 European Commission, AI and automation, https://ec.europa.eu/knowledge4policy/foresight/topic/changing-nature-work/AI-and-automation_en
26 IPPR, Technology, globalization and the future of work in Europe, 2015. https://www.ippr.org/files/publications/pdf/technology-globalisation-future-of-work_Mar2015.pdf?noredirect=1

Industry Federation (FIEC) expresses concerns about this challenge in its position paper on the vision for the sector "Construction 2050 – Building tomorrow's Europe today": "By investing in lifelong learning, in better working conditions and social protection, in a healthier and safer working environment and in better promotion of career opportunities, the construction sector can attract qualified workers and new talent. Addressing the current skill gap and anticipating future skill needs in the construction sector will mean providing more, better and safer jobs for European citizens"[27]. The construction sector is among the most substantial economic sectors in the EU, in terms of the share of people it employs and the share of Gross Domestic Product (GDP) it generates. The sector is also central to climate adaptation and mitigation policies, as it generates the largest waste stream in the EU with 30% of all waste[28], and is associated with high energy consumption, resulting in reforms directed at new sustainable building standards. The sector's importance will only increase in the future, in line with global megatrends such as urbanisation and a push for an updated infrastructure[29].

The push towards more sustainable and environmentally aware economic growth alongside technological developments is impacting the need for skill development in the construction sector. Innovation in the sector and EU regulation are creating **new drivers for the development of the sector** and desired skills for its workers.

- **Energy efficiency (EE)** is still one of the main drivers of skill development in construction. The sector is responsible for about 40% of energy use in the EU and has the largest potential for cost effective savings. With the existing and updated regulations on energy savings and efficiency, circular economy and rising consumer demand for optimal energy solutions, construction companies are confronted with the urgent need to update the skills of their workforce.
- **Digitalisation** also brings new skill requirements for workers. Automation and computerisation of processes and the increasingly widespread utilisation of Building Information Modelling (BIM) are promising gains in efficiency and productivity of construction processes. However, these instruments are not widely used in the construction sector and the sector needs to develop new competences and methods of working.

While companies might struggle to find skilled workers, there is another trend gaining ground. Keeping up with rising demand for innovative building and renovation methods becomes a question of competitiveness and growth, with companies providing training at work and upskilling existing employees. In its Council Recommendations on Upskilling Pathways, the Council defines skills as a determining factor for "competitiveness and the capacity to drive innovation. [Skills] are a pull factor for investment and a catalyst in the virtuous circle of job creation and growth"[30]. Following the Upskilling Pathways Recommendations, EU Member States (MS) have committed to strategic and coordinated action in providing learning opportunities for the Union's 61 million low-skilled adults, whose highest educational level obtained is lower secondary education[31]. These learning opportunities encompass basic skills (literacy, numeracy and digital skills) and could be expanded to include broader higher qualifications.

In the construction sector skill shortages are often the case of skill mismatch, which is the difference between the qualification level of jobseekers and the job requirements. Skill mismatches can take the form of overqualification or underqualification. The construction sector in Europe has one of the highest levels of

[27] FIEC, Construction 2050 – Building tomorrow's Europe today", 2019. http://www.fiec.eu/en/cust/documentview.aspx?UID=2fb4f61f-fea7-40f5-a049-6b9e703e2463

[28] European Commission, Construction and Demolition Waste, Trend Paper, http://ec.europa.eu/environment/waste/construction_demolition.htm

[29] World Economic Forum, Shaping the Future of Construction Inspiring innovators redefine the industry, 2017 http://www3.weforum.org/docs/WEF_Shaping_the_Future_of_Construction_Inspiring_Innovators_redefine_the_industry_2017.pdf

[30] European Commission, Council Recommendation on Upskilling Pathways: New Opportunities for Adults Taking stock of implementation measures, 2019. https://ec.europa.eu/info/sites/info/files/file_import/implementation-report-upskilling-pathways_en.pdf

[31] Ibidem.

overqualification, with about **one third of workers who are overqualified for the job they do**[32]. On the other hand, as reflected in the joint statement on labour shortages and skill mismatches, signed among others by FIEC, representing the construction sector employers' side, underqualification is common too: "Not only is there the emergence of new jobs that require new skills, but existing jobs are profoundly transformed, with some tasks disappearing and some new tasks being added"[33]. Several structural challenges affecting skill development and impacting mismatches persist:

1. **The decrease in the number of young skilled workers** in the sector constitutes a threat for its development and growth. While economic growth and technological solutions increase productivity, and provide opportunities for the sector's expansion, it is dependent on the availability of skilled people. The steady decline of young workers is linked to the negative image of the construction sector, safety risks and unattractive working conditions. The decline in the number of students enrolled in skilled manual profession programmes in the EU is expected to lead to additional labour needs of these professions in the future, as the number of new and young workers is not sufficient to replace the current ageing workforce in construction.
2. **The ageing of the construction sector's workforce** has been recorded as a continuous issue. The average age of workers in construction-related fields is increasing (in Germany for instance, the majority of construction workers are in the 35-50-year age bracket), that could generate additional barriers for the integration of new skills in the industry. This situation corresponds to overall demographic trends in the majority of MS.
3. **Mobility** is becoming an important factor in the labour distribution in Europe. Indeed, the mobility of highly-skilled workers from countries with lower wages to countries with higher wages can create a shortage of high-skilled workers in the former, whilst filling the gaps in the more developed economies. For example, some countries (such as Estonia, Romania) highlight difficulties in retaining highly skilled construction workers. In parallel, Nordic countries (e.g. Sweden and Finland) have been reporting an increase in the number of foreign workers in recent years.
4. **The misalignment between Vocational Education and Training (VET)** and the demand for skills in the construction labour market slows the development of the sector down, often leaving workers with outdated skills. On average in the EU, around 35% of employees in the construction sector experienced changes in technologies used in the workplace in the past five years[34]. The share increases for science and engineering associate professionals, where, on average, 57% of the employees experience technological change at work. At the same time, under-skilling disproportionately affects sectors that generally employ people with lower education, such as construction and manufacturing, with an under-skilling rate of over 35% of the workforce. This suggests that the rapid changes experienced in these sectors demand continuing vocational training[35].

In the coming decades, skill-related policies are expected to continue expanding and modernising VET and up/re-skilling at the work place. The New Skills Agenda for Europe defines 10 actions to make skills, training and support available. One of these actions, Blueprint for Sectoral Cooperation on Skills, aims to improve skill intelligence and to address skill shortages in specific sectors. In 2018, the construction sector joined the Blueprint. The Blueprint develops a series of activities to address the skill shortages in the construction sector:

[32] CEDEFOP, Skills, qualifications and jobs in the EU: the making of a perfect match? Evidence from CEDEFOP's European skills and jobs survey, 2015. http://www.CEDEFOP.europa.eu/files/3072_en.pdf

[33] FIEC, Joint statement on labour shortages and skills mismatches, 2019. http://www.fiec.eu/en/cust/documentview.aspx?UID=5855361b-e06f-406e-9990-32257befea76

[34] CEDEFOP, Insights into skill shortages and skill mismatch 2018. https://www.CEDEFOP.europa.eu/files/3075_en.pdf; Please note that the results quoted in this paragraph refer to a survey conducted in 2014.

[35] Ibidem.

- gathers information about the skills needs and shortages in the sector;
- develops a sector skill strategy;
- develops occupational profiles, vocational programmes and qualifications;
- designs a long-term action plan to be rolled out at the national and regional levels;
- promotes the use of EU tools such as:
    - the European qualifications framework (EQF);
    - European skills, competences, qualifications and occupations (ESCO);
    - Europass;
    - the European credit system for vocational education and training (ECVET);
    - the European quality assurance in vocational education and training (EQAVET)[36].

Blueprint for the Construction Industry gathers 24 partners (three EU umbrella sectorial organizations, nine national sectorial representatives and 12 Vocational and Education Training providers) from 12 EU countries to develop a new sectorial strategic approach to cooperate on skills in the construction industry and support a better match between what skills a company needs, and the skills taught at training centres[37].

In parallel, the sector's largest EU level federation, FIEC, has issued recommendations for the way forward, identifying strategically important thematic areas for the sector 2050 agenda. According to their vision for Construction 2050, transforming construction value chains to ecosystems is crucial in order to shift towards circular economy methods of production. This would require an adaptable policy framework to support the transformation of the built environment and the sector. Moreover, the approach to policy making must be holistic "in order to implement coherent and balanced policies and legislation"[38]. Finally, the challenges of adapting the sector to a circular economic model, digitalising the sector and adopting sustainable environmental solutions for the built environment will require strong partnerships at the EU and the national levels, as well as between construction sector stakeholders[39].

Within this context, this Analytical Report aims to show a snapshot of the skill situation in the construction sector in the EU28. Namely, **Chapter 2 provides a high-level analysis of the workforce in the sector**, focusing on the quantitative analysis of the population, employment and education data. **Chapter 3 provides an analysis of the main drivers of skill acquisition in construction**, namely EE, market driven innovation and improvements in occupational safety and health (OSH), along with an increased awareness of the importance of upskilling existing staff. **Chapter 4 provides an overview of the obstacles for skills in construction**, examining the issues of image of the sector, structural barriers to human resources development, lack of VET and mobility. Next, **Chapter 5 focuses on the main policy responses to the skill barriers and drivers in the EU**, highlighting best practices and lessons learnt from various national and regional programmes. Finally, **Chapter 6 summarises lessons learnt** from the report.

[36] European Commission, Blueprint for sectoral cooperation on skills, https://ec.europa.eu/social/main.jsp?catId=1415&langId=en
[37] Construction Blueprint, http://constructionblueprint.eu/
[38] FIEC, Construction 2050 – Building tomorrow's future today, 2019. http://www.fiec.eu/en/cust/documentview.aspx?UID=2fb4f61f-fea7-40f5-a049-6b9e703e2463
[39] Ibidem.

Definitions

For a comprehensive understanding of the Analytical Report, it is valuable to clarify the terminology used in this report.

According to an Organisation for Economic Co-operation and Development (OECD) definition, skills generally encompass cognitive and non-cognitive abilities, including abilities specific to a particular job, occupation or sector[40].

Within the context of the current report, we focus specifically on technical skills related to the construction sector. **Technical skills** are a combination of cognitive and non-cognitive abilities, including also manual skills. For the purposes of this report and following the established definitions in data collection and existing literature, we adopt the terminology of **high skills and low skills**, while also establishing that regardless of the limitations of such definitions, both types refer to specific professional skills, which require training and education. Generally, the term "high skills" concern qualifications and competences acquired through tertiary education, while low skills refer to skills acquired through apprenticeships, VET and other training, excluding tertiary education.

This report further adopts the Eurostat definition of **skill mismatch**, referring to the gap between the aggregate supply and demand for skills at the macro level. In other terms, this concerns a suboptimal situation of observed mismatches between available workers and their qualifications and available jobs and their skill requirements[41]. Skill mismatches at the micro level are further classified as either vertical, "i.e. the mismatch between formal education and job requirements measured against a benchmark" or horizontal, such as "mismatches between the worker's field of education and job requirements"[42]. Consequently, **skill shortages** occur when "employers are unable to recruit staff with the required skills in the accessible labour market and at the ongoing rate of pay"[43,44]. Importantly, skill shortages do not necessarily translate into a skill mismatch, however, they can result in a mismatch if employers find themselves forced to recruit workers who are under-skilled for a specific position. Conversely, there could be situations in which over-skilled workers accept positions below their abilities, due to, for instance, an unfavourable economic situation.

The definitions of the main concepts used in this Analytical Report are provided in the Table below:

Table 1: Main definitions

Concept	Definition
Qualification mismatch	Discrepancy between the highest qualification held by a worker and the qualification required by his/her job.
Overqualification	Situation where the worker's highest qualification exceeds the one required by his/her job.
Underqualification	Situation where the worker's highest qualification is lower than the one required by his/her job.
Skill mismatch	Discrepancy between the skills – both specific and general - possessed by a worker and the skills required by his/her job.

40 OECD, Getting Skills Right: Skills for Jobs Indicators, 2017. https://www.oecd.org/employment/getting-skills-right-skills-for-jobs-indicators-9789264277878-en.htm

41 Eurostat, Statistical approaches to the measurement of skills, https://ec.europa.eu/eurostat/documents/3888793/7753369/KS-TC-16-023-EN-N.pdf/438b69b5-2fcb-4923-b9e2-fa7b59906438

42 Ibidem.

43 Institute of Labor Economics, Skill Shortages and Skill Mismatch in Europe: A Review of the Literature, http://ftp.iza.org/dp12346.pdf

44 Quintini, G, Right for the Job: Over-qualified or Under-skilled?, OECD Social, Employment and Migration Working Papers n.120, 2011. https://www.oecd-ilibrary.org/social-issues-migration-health/right-for-the-job_5kg59fcz3tkd-en

2. Workforce and skills in construction

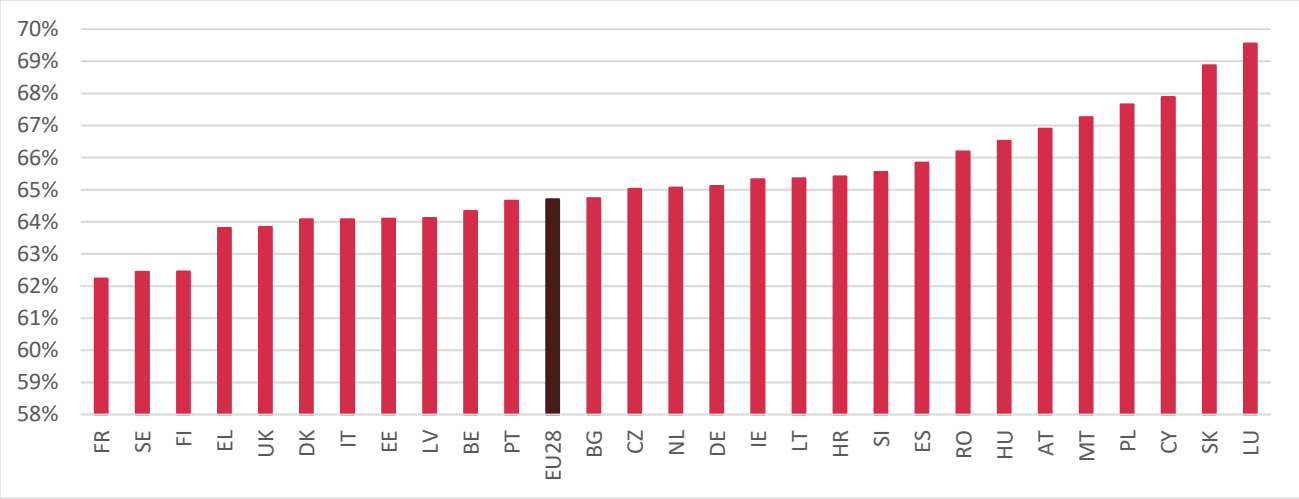
The current chapter presents broad demographic trends influencing the human capital basis in the EU, such as the decreasing share of working-age population, population projections and mobility and migration. It then focuses on the characteristics of the workforce in the construction sector through an analysis of statistic data related to demographic dynamics, the level of education across the population and the level of skill shortage in construction activities in the EU. The analysis of the current state of the workforce uses the latest available statistic data to draw conclusions.

2.1 Workforce in construction

Overview of demographic trends in the EU

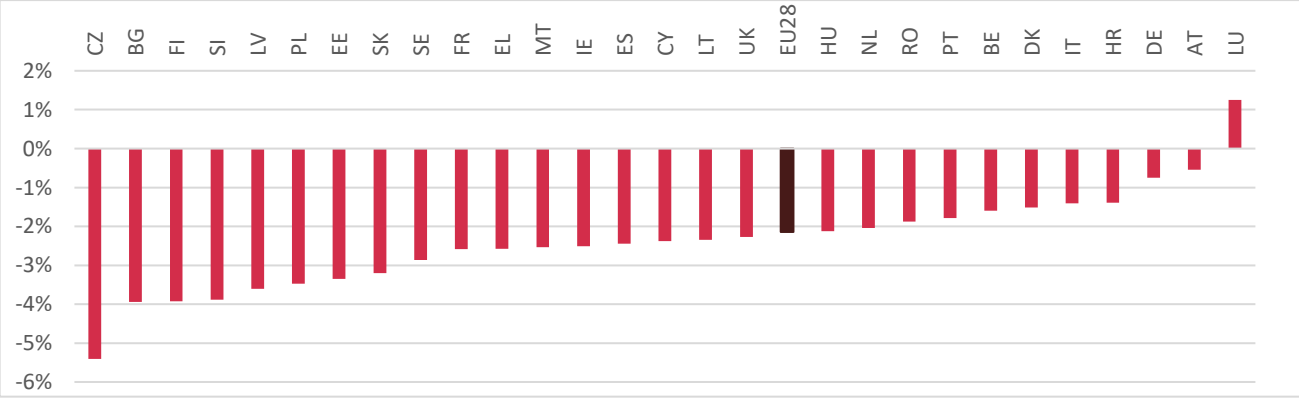
The current structure of the European population is defined by **lower birth rates** and **increasing life expectancy**. These dynamics imply an ageing population across EU28 countries, paired with a shrinking proportion of people of working-age (age band 15 to 64 years old). Shifting balance between the working-age and the post-retirement population implies an increase in the burden borne by society. This is linked to the increasing demand for social expenditure and public services related to the ageing population and raising challenges of financing the needs of retirement population by shrinking working-age workforce.

Figure 1: Share of working-age population in total population in 2018, %



Source: Eurostat, 2019

Figure 2: Change in the share of the working-age population over 2010-2018, %



Source: Eurostat, 2019

The speed of ageing population varies across the MS. All MS, except of Luxembourg, experienced drop in the working-age population (Figure 2). Czech Republic, Bulgaria, Finland and Slovenia registered the biggest decline in the share of the working-age population over 2010-2018 (5.4%, 3.9%, 3.9% and 3.9% respectively) compared with the EU average of 2.1% decline.

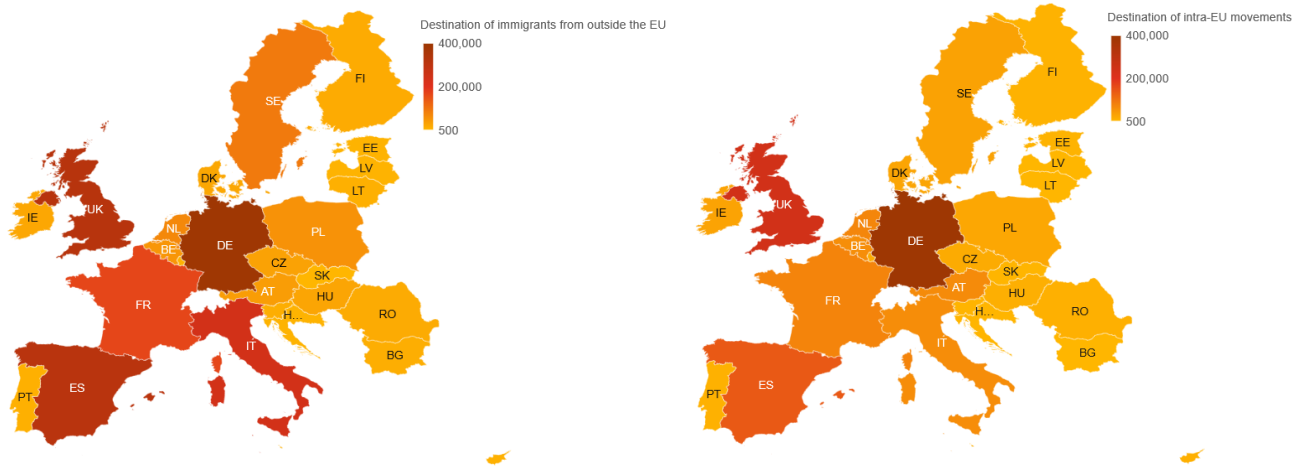
The median age of the EU population in 2018 was 43.1 year, higher than in 2015 (42.4 year), meaning that half of the EU28's population was older than 43.1 year. The median age had increased by almost three years during the period 2008-2018 (from 40.4 year in 2008), highlighting the speed of ageing workforce.

Countries with the largest differential in the median age in 2010-2018 were Ireland, Spain, Lithuania, Portugal and Slovakia, with over three years of increase indicating a faster progressive increase of the older half of the population, perhaps due not only to ageing effects but also to high youth unemployment and related mobility. On the other side of the spectrum, Sweden, Luxembourg, Belgium and Finland were the countries with the lowest change in the median age population in 2010-2018.

An overview of changes in the population structure observed during the period 2008-2018 also needs to take into account **migration and mobility trends** in the EU28. As illustrated in Figure 3 below, declared migration and mobility movements across the EU accounted for an inflow between 2 and 4.5 million individuals per year (including both extra and intra community movements). The evolution of such movements across the EU has increased each year at a relatively constant pace and has peaked significantly in 2015, corresponding to the inflow of refugees.

Further research into the effects of immigration (outside EU) and mobility inflows (movement inside the EU) by age groups and their employability across industries in the short and long term may provide insight on the effects of such movements in the construction sector. After 2015, the immigration decreased significantly, but remained above 2014 levels. However, mobility has started to decrease between 2015 and 2016, only increasing slightly between 2016 and 2017. Mobility and immigration trends significantly affect the share of working-age population across the EU and are expected to influence the distribution of skill needs across the EU MS.

Figure 3: Destinations for immigrants inside and outside of EU in 2018, number of persons



Source: Eurostat, 2019

Overview of future demographic perspectives in the EU

As the ageing population increases across the EU28, an estimation on population dynamics in the long term indicates that imbalances between the active and the retiring population will continue to accentuate during the next decades, with a potential peak towards 2050. Figures show that the EU's working population shrank

for the first time in 2010 and is expected to decline every year until 2060. This trend results from lower fertility rates and an increased life expectancy. As such, the share of older people relative to their working populations increases sharply, leading to an increase on the burden on those of working-age[45]. The share of the elderly population in total population within the EU is projected to increase from 19.2% at the start of 2016 to 29.1% by 2080; or 97.7 million elderly people in 2016 to 151.0 million elderly people in 2080.

Across the MS, Lithuania, Bulgaria, Latvia, Croatia and Romania are expected to see the biggest drop in the share of the working-age population by 2050 (-32.4%, -30.5%, -27.0%, -26.8% and -26.0% respectively). These decreases are driven by continuing ageing of population and increasing migration and mobility of work-age population across the EU. On the other side of the spectrum, Luxembourg, Malta, Sweden and Cyprus are expected to grow the share of working-age population by 33.4%, 31.4%, 27.5% and 20.1% respectively (Figure 4).

Figure 4: Expected changes in working-age population over 2020-2050 (between 15 and 64 years old)

Source: Eurostat, 2019

Employment in the construction sector

The workforce employed in the broad construction sector is defined in the present Analytical Report by all construction related activities within EU28 economies (construction-related manufacturing activities, narrow construction, real estate activities, and architectural and engineering services, collectively referred to as the broad construction sector)[46].

According to Eurostat, the total number of persons employed in the broad construction sector at EU level reached **21.3 million in 2017[47]**. This represented a 1.9% increase since 2011[48].

[45] European parliament, Demographic outlook for the European Union, 2019. http://www.europarl.europa.eu/RegData/etudes/IDAN/2019/637955/EPRS_IDA(2019)637955_EN.pdf

[46] Whenever specified, constriction sub-sectors in this report refer to the following Eurostat categories: manufacturing activities (NACE C16.2, C23.3, C23.5, C23.6, C23,7, C25.1), narrow construction (NACE F41, F42, F43.1, F43.2, F43.3, F43.9), real estate activities (NACE L68.1, L68.2, L68.3), architectural and engineering services (NACE M71.1).

[47] Data for 2018 and 2019 is not available.

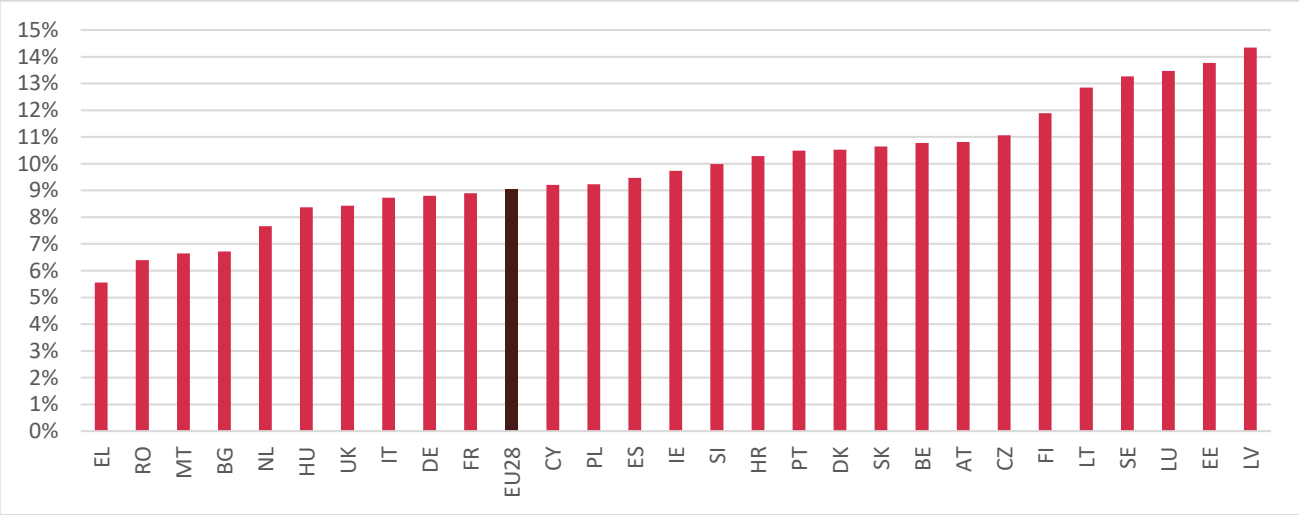
[48] Data for 2010 is incomplete.

The sum of the persons employed in Germany, United Kingdom, France, Italy and Spain represented 61.5% of the total workforce of the EU broad construction sector in 2017.

Figure 5 below provides an illustration of the share of labour force of the broad construction sector across national economies. With regards to the total population, construction-related industries represent 9% of the total number of persons employed in the general economy (2017), being the major source of employment in many EU countries. For instance, the proportion of broad construction sector workforce is the highest in Latvia (14.3%), Estonia (13.8%) and Luxembourg (13.5%), with respect to the rest of the economy. On the contrary, Greece (5.6%), Romania (6.4%) and Malta (6.6%) report the lowest shares of the broad construction sector employment in their respective economies.

Baltic and Scandinavian countries rank among the countries with the highest proportion of construction-related industries as a share of total workforce.

Figure 5: Share of broad construction workshare in the total workforce in 2017, %[49]

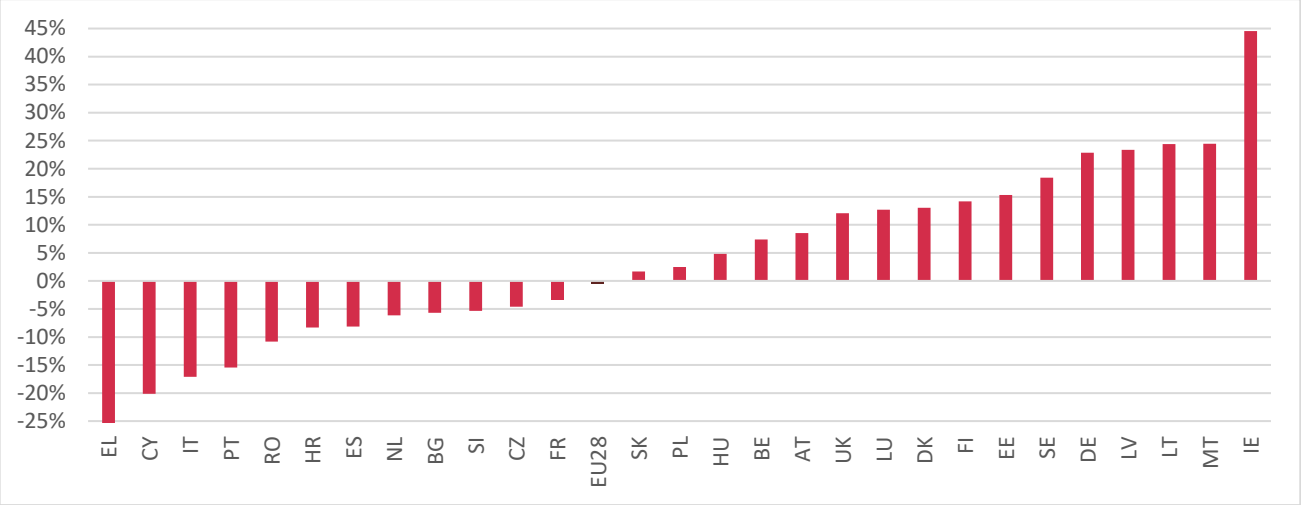


Source: Eurostat, 2018.

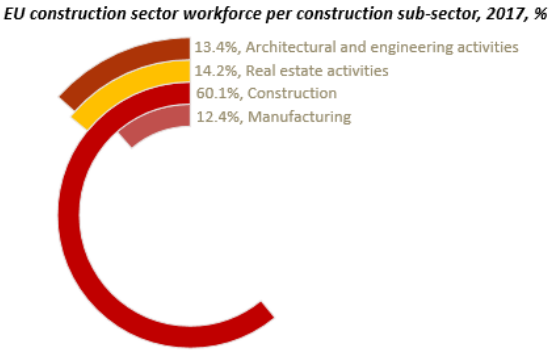
Economic trends negatively affected the employment in the construction in 2010-2017. The construction sector typically reports a delayed reaction to changes in the economic context, whether it be a shock or a revival of the economy. Therefore, variations in the employment trends in the sector displayed a later onset compared to other sectors. The evolution of such employment changes presents several differences across MS. Indeed, several countries experienced a considerable increase in the number of persons employed in the sector in 2011-2017, such as Lithuania, Ireland and Germany, whereas others experienced important losses (e.g. Greece, Cyprus and Italy) (Figure 6). These key observations indicate that the construction sector has experienced a recovery in some MS following the economic trends, even though structural differences still prevail across several EU countries.

[49] Data for 2018 and 019 is not available.

Figure 6: Changes in the size of the construction sector workforce (persons employed headcounts) between 2011-2017[50]



Source: Eurostat, 2019



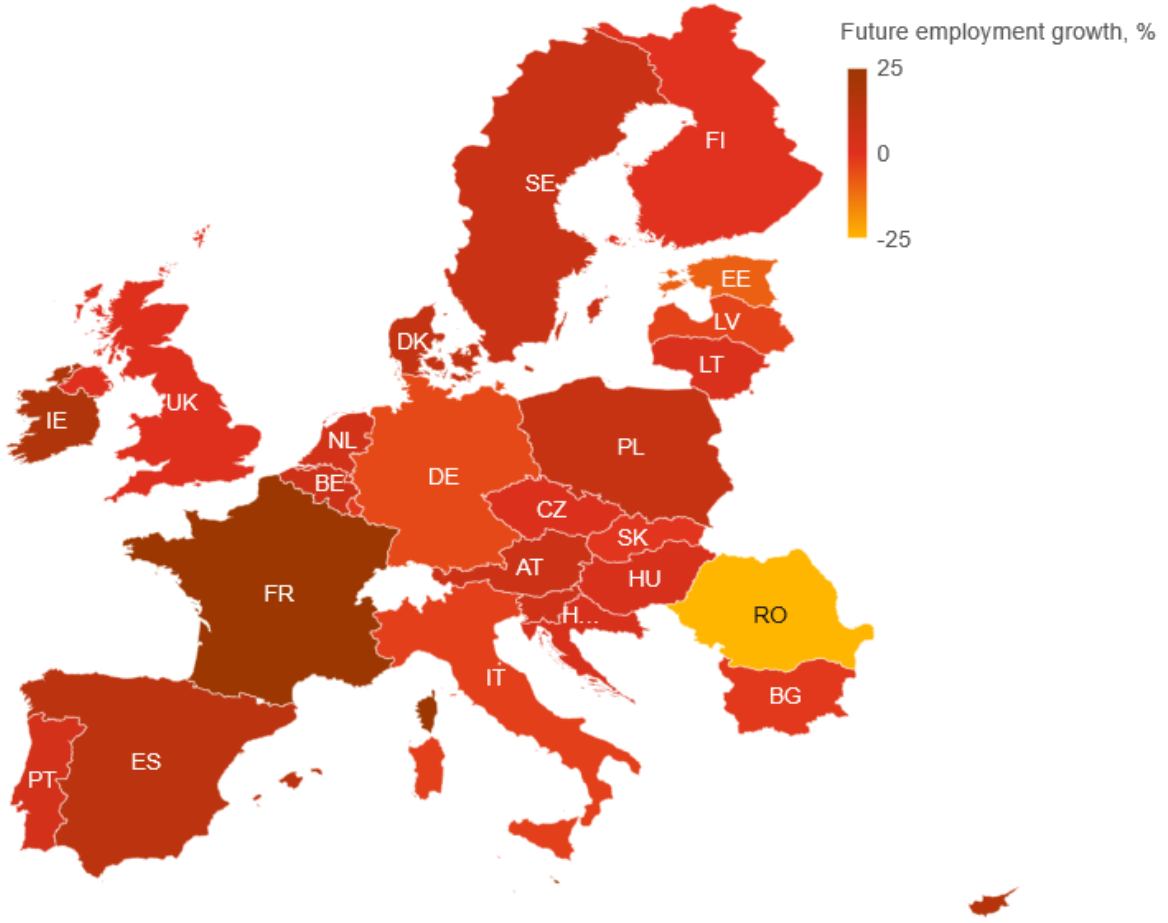
In terms of the evolution of the workforce across construction sub-sectors, MS which experienced an important decrease in their workforce, such as Greece, Cyprus, Italy, Spain, Portugal or Croatia, mainly saw a fall in the number of workers in the narrow construction sector during the period 2011 to 2018**.**

According to CEDEFOP, about 1 million new and replacement workers will be needed by 2025. Additionally, the skills needed in construction are likely to change to meet demands for "green" and energy-efficient buildings[51].

As per future trends, it is estimated, that by 2030, the employment in the EU construction sector will increase by 4.3%. This grow will vary across the MS. Romania, Estonia, Germany and Latvia are expected to decrease the employment by 27.4%, 9.0%, 4.6% and 3.6% respectively. On the other side, the highest increase in the construction employment by 2030 is forecasted in France (25.6%), Malta (22.2%), Ireland (17.8%) and Cyprus (15.8%) (Figure 7).

[50] Please note that the values for Finland are calculated as compared against 2010 values due to lack of available data from 2011.
[51] CEDEFOP skills forecast, 2016

Figure 7: Future employment growth in construction sector across Member States in 2018-2030, %



Source: Skill Panorama, 2019[52]

Beyond the analysis of gender distribution in the sector, the age distribution is analysed based on four main categories:

1. young workers aged 15 to 24 years old who often provide low and medium skills with little or no experience,
2. middle aged workers from 25 to 49 years old who may be assumed to provide all types of skill levels with considerable experience,
3. elder workers from 50 to 64 years old assumed to provide solid experience in the field and handling middle management responsibilities, and
4. individuals aged over 64-year-old who are also assumed to provide considerable experience in the field.

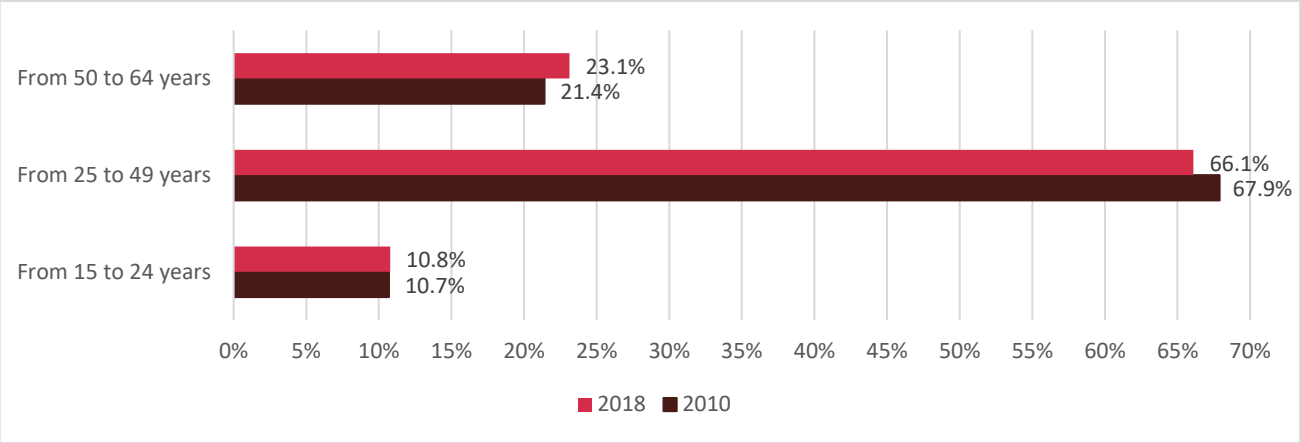
Changes in the distribution of persons employed in the construction sector across these categories during the period 2010-2018 clearly show the age effects of the ageing population of persons employed.

The share of adults aged 25 to 49 years old, who represent the core of the sector's workforce, has decreased from 73.9% in 2010 down to 71.5% in 2018.

[52] Skill Panorama. Construction, 2019. https://skillspanorama.CEDEFOP.europa.eu/en/sectors/construction-1

At the same time the share of elder workers aged 50 to 64 years old has increased by almost 3% during the same period. Hypotheses or possible explanations to these trends may include a reconfiguration of the age structure in the industry following the economic downturn, as well as generational effects and the lack of attractiveness of the sector for younger workers. Regardless of the socioeconomic assumptions retained, it is evident that action needs to be taken in order to respond to the ageing effects of persons employed in order to ensure the competitiveness of the sector.

Figure 8: Distribution of persons employed in the broad construction sector by age category



Source: Eurostat, 2019.

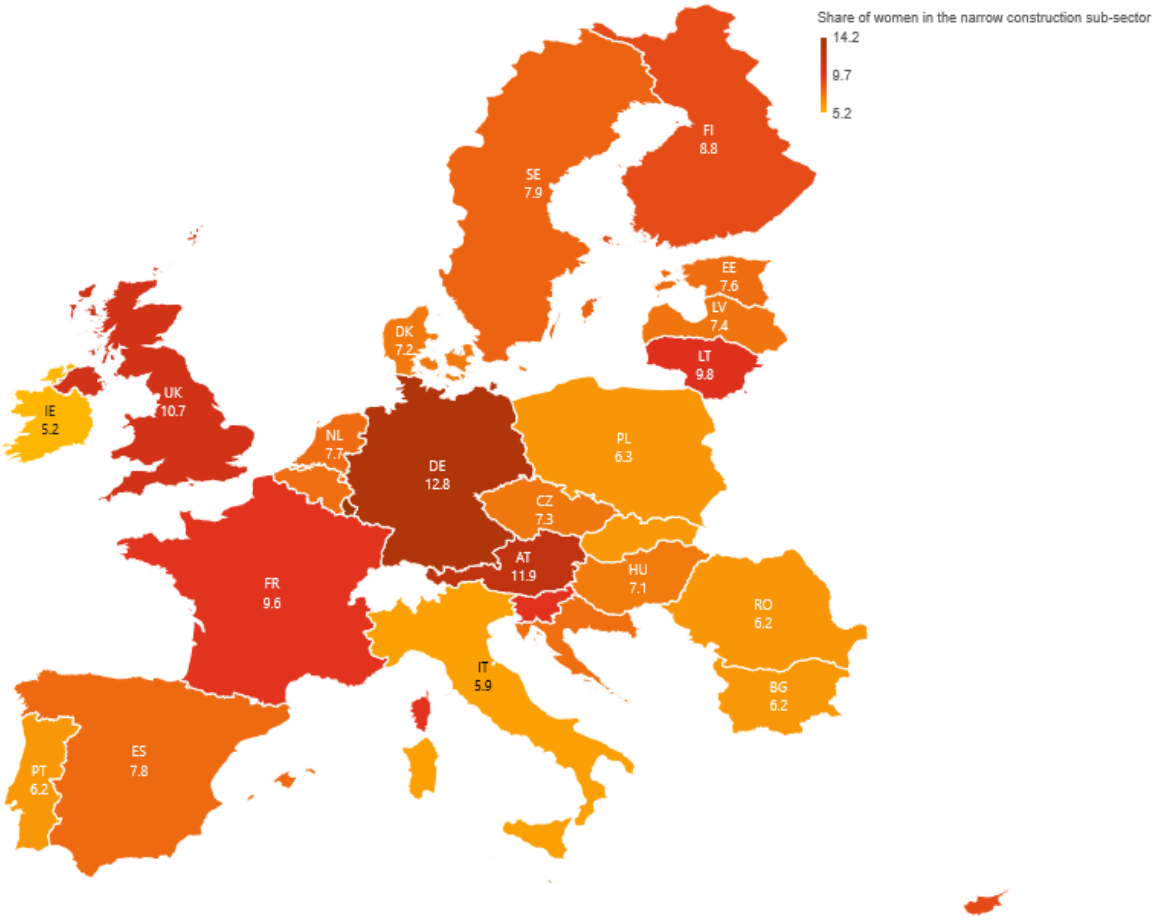
While in 2010 the number of people working in the construction sector aged 50-64 was 21.4%, as illustrated in Figure above, it has increased to 23.1%, highlighting a general increase in working-age population. Additionally, the share of people aged 25-49 has also experienced an almost 2 percentage point decline between 2010 and 2018.

Further analysis of the composition of the construction workforce indicates that women represented 10.0% of the total in 2018, an increase compared to the 2010 share (9.6%), potentially indicating a general improvement in gender inclusiveness in the EU construction sector (Figure 6). Countries with the highest share of women in their construction workforce in 2018 include Luxembourg (16.4%), Germany (13.8%), Austria (13.2%) and the United Kingdom (12.4%), while the lowest proportions are found in Greece (6%), Ireland (5.5%) and Romania (6.4%).

For instance, according to Eurostat, in 2018, women made up 12.0% of the workforce in civil engineering, 10.5% in construction of buildings and 9.4% in specialised construction activities[53]. On the positive side, in some of the construction sub-sectors the share of women is considerably higher. In the real estate sub-sector women made a majority of the workforce in 2018 (50.3%), while in architectural and engineering activities women represented 30.3% of the workforce.

[53] According to Eurostat, specialised construction activities (NACE F43) includes: demolition and site preparation, electrical, plumbing and other construction installation activities, building completion and finishing and other specialised construction activities.

Figure 9: Share of women in the narrow construction subsector in 2018, %



Source: Eurostat, 2019

2.2 Current state of skill needs and vacancies

The earlier section reviewed the general demographic trends in the EU alongside with the expected further developments in the population structure, based on the latest projections. This analysis portrays the general trend in the human capital basis across most of the MS, with the ageing population and the shrinking share of working-age population, thus exacerbating already existing labour shortages. In this section, the analysis explores the impact of this megatrend on the construction sector, based on a set of indicators, divided in sub-sections.

Employment by occupation in the EU construction sector remained stable in 2012-2017. Across EU, the top three occupations in 2017 were construction workers (43.1% of employment), science and engineering technicians (8.7%) and electro engineering workers (7.8%). At the same time, the growing share of high-tech occupation was recorder across the EU in 2018. This varied from 3.7 of employment in Ireland to 21.9% in France, with 12.4% on average across the MS[54].

Vacancy rate[55] shows the extent to which the demand for labour remains unmet. It can indicate a distortion in the demand and supply and ultimately, a skill mismatch between the pool of existing skills available at a

[54] CEDEFOP, Skills Panorama, 2019. https://skillspanorama.CEDEFOP.europa.eu/en/sectors/construction-1

[55] The meaning of "vacancy rate" used in this report refers to Eurostat's definition: "A 'job vacancy' is defined as a paid post that is newly created, unoccupied, or about to become vacant: (a) for which the employer is taking active steps and is prepared to take further steps to find a suitable

given period and location and skills sought by employers. Vacancy rate shows an existing inability to match the supply and demand of labour in the sector.

The average vacancy rates in narrow construction and real estate activities sub-sectors in the EU28 increased by 1.7% and by 1.3% over 2010-2018, respectively. This shows an accelerated increase in the vacancy rates, compared to the one observed over 2009-2015, which was at 0.2%, respectively. Overall, the trend indicates that the mismatch between the supply and demand for labour in the construction sector is growing, leading to potential skill shortages. Figure 10 below provides an illustration of the evolution of average vacancy rates in the EU28 for these sub-sectors. While both curves remain flat over 2010-2013, a sharper growth is displayed after 2015. In 2017, the vacancy rates trend in the real estate activities reverses to a slight decline, while the trend for the narrow construction sub-sector continues its growth path. This development is rather in line with the development of bottleneck vacancies, for instance, which continue being experienced most severely in the narrow construction.

Figure 10: Vacancy rates in the construction sector, EU average (2010 - 2018)

Source: Eurostat, 2019.

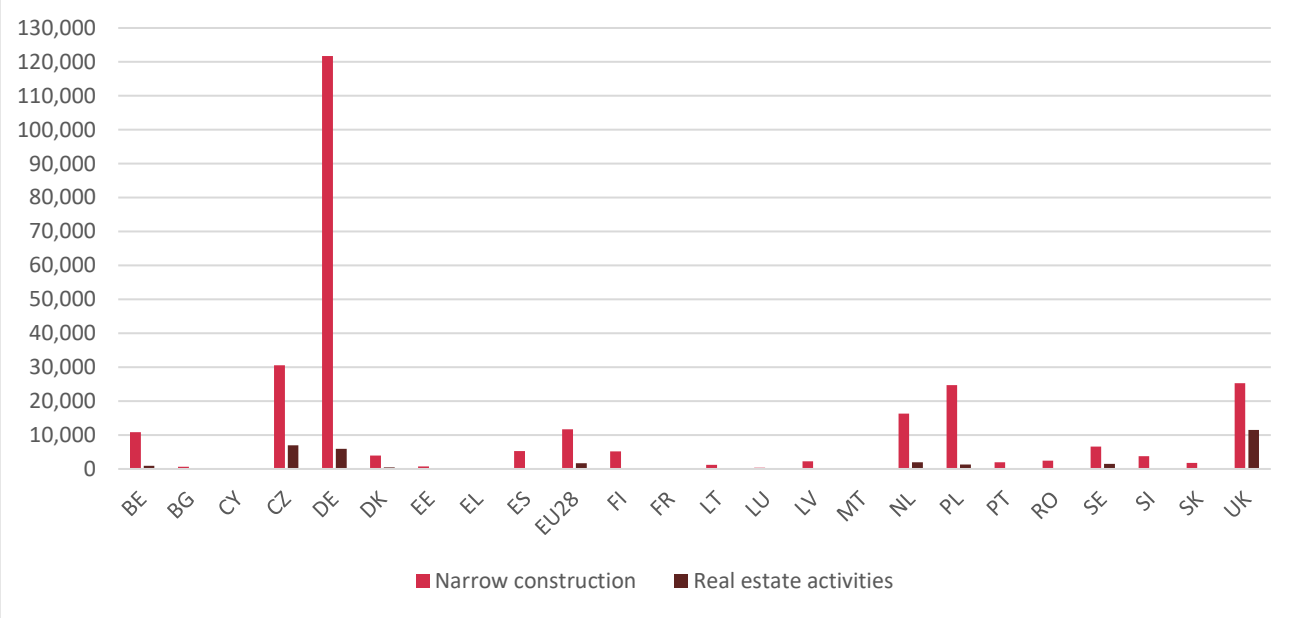
Differences between the number of vacancies in the construction sector vary strongly across EU MS (Figure 11). Regarding the narrow construction, Spain and Cyprus are the only two countries with a decreased number of vacancies over the period 2010-2018 by 41.7% and 60.8%, respectively. On the other hand, this number has grown in all other MS, for which data is available. The largest number of job vacancies is observed in Germany, amounting to 121,736 unfilled positions in 2018 (5.2% of people employed in the sub-sector), compared to 51,892 in 2010 (3.2%). While this is the largest increase in absolute number of vacancies (representing a 134.6% jump), the largest percentage increase was observed in the Czech Republic, where the number of job vacancies rose by 621.9%, albeit from lower levels (30,593 unfilled job positions in 2018, 8.2% of the workforce in the sub-sector). This was followed by Slovenia, where over the same period the number of vacant positions grew by 411.7%, reaching 3,789 in 2018.

The situation was similar for the real estate activities sub-sector, with the number of vacant positions decreasing only in two MS – Slovakia and Bulgaria. Over 2010-2018, this number decreased by 44.4% and 42.2% respectively, reaching 59 positions in Slovakia and 56 in Bulgaria. On the other hand, the United Kingdom (11,500), Czech Republic (7,000) and Germany (5,956) display the largest amount of unfilled job vacancies in the sub-sector (2.1%, 11.8% and 1.2% of the workforce in these sub-sectors respectfully[56]). In terms of the percentage increase, the largest growth was observed in Romania (608.7%), Czech Republic (349.2%) and Slovenia (260.7%). It is worth noting, however, that in both Romania and Slovenia this represented a far lower level of vacancies, equalling 184 and 101 in 2018 respectively.

candidate from outside the enterprise concerned; and (b) which the employer intends to fill either immediately or within a specific period of time." For more information, please visit the following link: https://ec.europa.eu/eurostat/cache/metadata/en/jvs_esms.htm

[56] For the United Kingdom, the share of the workforce calculated for 2017, as data for 2018 was not available.

Figure 11: Number of job vacancies in narrow construction and real estate activities sub-sectors in 2018[57]



Source: Eurostat, 2019

As per future trends, it is expected that by 2025, most of the job openings in construction sector (58%) will require medium qualification of employees, while 31% of vacancies will be reserved for highly qualified candidates[58].

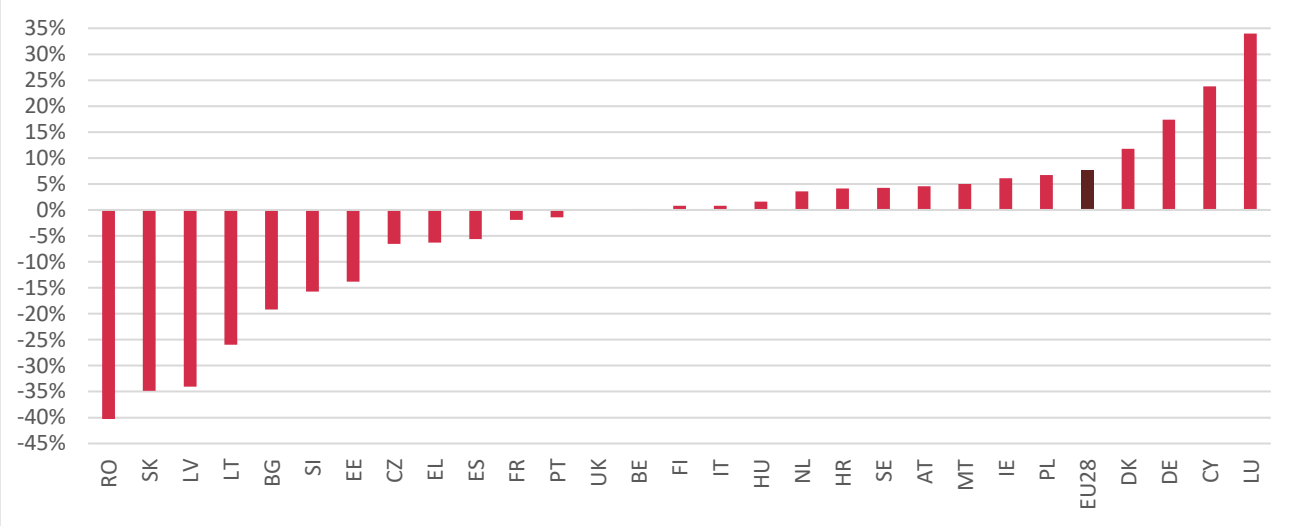
Level of education

The data on vacancy rates and the absolute number of job vacancies in the narrow construction and real estate sub-sectors strongly indicate an existing disruption in the labour market, resulting in a mismatch between supply and demand for specific skills and competences. The reasons for the observed mismatches are complex and could range from the general economic situation in each MS, to sector-specific issues of retention and attraction of workers. Level of education is one of the indicators that could shed more light on the topic.

The level of education in the construction sector is defined by the qualifications obtained by construction workers across the EU. These are often heterogeneous across countries, presenting important variations as reflected in Figure 12 below.

[57] Data for Austria, France, Hungary, Ireland and Italy are not available.
[58] CEDEFOP, Skills Forecast, 2016. https://www.CEDEFOP.europa.eu/files/8093_en_0.pdf

Figure 12: Evolution in the number of tertiary education graduates in engineering, manufacturing and construction by country over 2013-2017, %[59]



Source: Eurostat, 2019.

Note: Please note that due to data availability, the calculation for Poland is based on a comparison with 2014 data.

The largest increase in the number of tertiary education graduations is displayed in Luxembourg, Cyprus and Germany. To an extent, this is in line with general trends, such as the boom of the construction sector growth in Luxembourg in light of strong housing demand, economic and demographic growth and the need for expansion of public infrastructure. Correspondingly, Germany is the country with the largest number of construction-related vacancies in the EU, thus partially providing a background for its position in this ranking. Interestingly, the number of graduations is high in Cyprus as well, where vacancies have actually decreased. On the other hand, decrease in the number of tertiary education graduations in the field are observed in Romania (40,3%), Slovakia (34.9%) and Latvia (34.1%). A decrease in graduations does not necessarily explain the general growing trend in vacancies, as these variables are defined by several complex factors. For instance, while graduations have decreased in Slovakia, the country is among the few where vacancy rates in real estate activities decreased over 2010-2017. A lower demand for specific skills can influence young people's decision and choice of a professional path and education.

In terms of the share of female graduates in the number of graduations in engineering, manufacturing and construction, there is an overall decrease (-1.2%) at the EU level over 2013[60]-2017. Generally, this share has increased in about half of the MS. The highest growth is observed in Ireland (+44.2%), Cyprus (+39.4%) and Germany (+25.2%). On the other hand, the MS with the largest drop in female graduates are Latvia (-41.9%), Slovakia (-41.6%) and Romania (-41.4%). Indeed, amidst the well-recognised shortage of skills in the sector, several MS have launched initiatives to attract more women to the construction sector, as well as to help female workers advance in their construction careers (see 5.4 Women in construction). In the light of this growing divide, however, more policies might be needed to incentivise women to join construction-related professions. Additionally, the decline in graduations in engineering, manufacturing and construction for women is far from the developments observed in the number of female graduates in natural sciences, mathematics and statistics, for instance. In this field, the majority of MS experience an increase, while in the cases of decline of graduations, the extent of the decline is not as large.

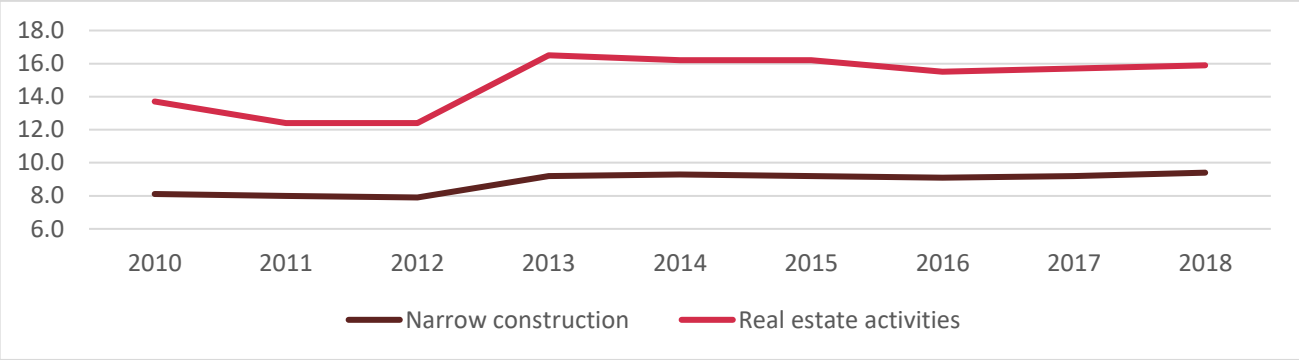
[59] Please note that data for 2018 is not available.
[60] No data available for previous years.

Participation in education and training

The present section investigates the participation of individuals, and specifically adults (aged between 18 and 64 years old), in education and training programmes.

The Figure below shows a rather flattened out evolution in the share of adults participating in education and training in two construction sub-sectors. While in both cases, the share grew between 2012 and 2013, developments have remained rather stable since, without much fluctuation. Considered together with the data on the tertiary graduations, participation in education and training is not following the same trend as the vacancy rates. This means that while job positions remain increasingly unfilled across MS, there is no large-scale increase in the acquisition of construction related skills.

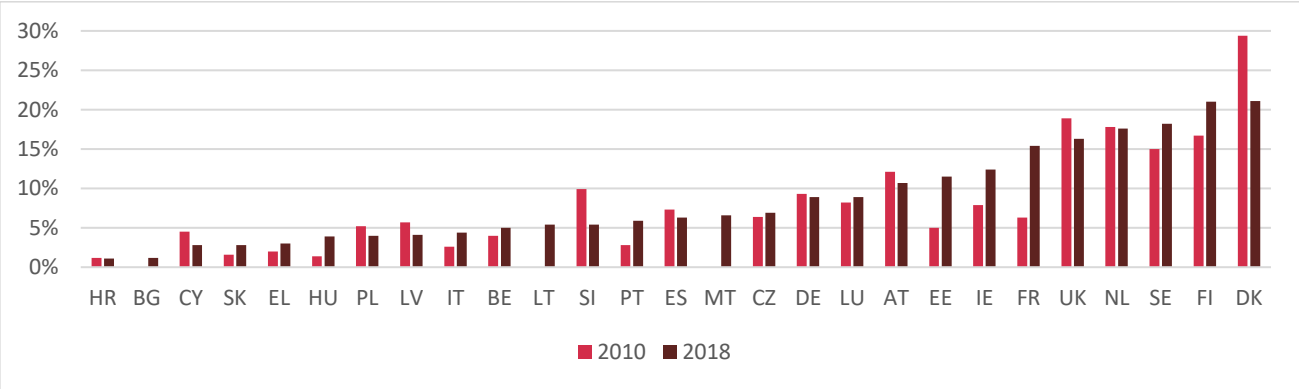
Figure 13: Evolution of the share of adults aged 18 to 64 participating in education and training in the narrow construction and real estate activities over 2010-2018, %



Source: Eurostat, 2019.

Figure 14 below provides a comparison per country, presenting the share of adult participation in education and training over 2010-2018. In narrow construction, the highest shares are observed in Denmark, Finland and Sweden. Germany, the country with the largest number of job vacancies, lags with only 9.0% in 2018, a slight decrease since 2010, when it stood at 9.4%. The large share of participation in the Nordic countries could be partially explained with the general VET system and support for adults in education, including through a robust system of apprenticeships (see Improving the quality of vocational education and training). On the other hand, Croatia, Bulgaria and Cyprus have the lowest share of adults participating in VET in narrow construction.

Figure 14: Share of 18-64 year old adults participating in education and training in narrow construction per country, %



Source: Eurostat, 2019

Bottleneck vacancies

It is widely accepted that one of the biggest obstacles to the development of the construction sector in the EU is the availability of human capital, both in terms of highly skilled workforce, as well as low skills, which require specific training and competences. While the job vacancies in the sector have grown steeply over the recent years, tertiary education and VET have not grown in line with the existing demand. As commented in the previous sections on vacancy rates, skill shortages appear when workers are unable to meet the needs of the labour market despite the high unemployment. However, the level of educational achievement and qualification of the workforce also plays a role in the misallocation of resources and mismatch between the supply and demand of the sectorial workforce. Mismatches could be alleviated by improving the existing skill base, through attracting new people in the workforce and upskilling the ones already in employment.

Bottleneck vacancies are reported by national institutions, public employment agencies and other industry stakeholders, and they represent activities in which shortages are identified, usually measured by ratios between ready to fill vacancies and unemployment rates. Bottleneck vacancies are thus interpreted as labour shortage in specific activities and occupations. This labour shortage is often explained by low enrolment in relevant training, leading to insufficient available qualification for these occupations. Such situations of labour shortage can only be addressed through regular training and education.

Moreover, as discussed in the Chapter 3. Driver and skill needs, new technologies and digitalisation play an important role on the sets of skills required for the future. Emerging technologies related to green construction start to generate a need and demand for specific skills that are currently lacking in the labour force. These skills need to be developed through educational strategies involving both national and local levels allowing workers to learn and use the technologies that are increasingly embedded in the different operational processes. Consequently, tackling the skill shortage problem includes foreseeing investment in Research and Development (R&D) and in the promotion of VET programmes. However, beyond tackling the problem with efforts to increase the levels of qualifications, it is important to notice that MS economies are heterogeneous, and that needs for specific skills in the construction sector in the short term need to be contextualised with regards to the demographic structure and dynamics of each MS and in the light of the characteristics of their respective economy and labour market. As an example, according to the report on the cost effectiveness of apprenticeship schemes[61], future needs of skills in the short term will be characterised by different levels of skill qualifications and education across countries.

Skill surpluses and the reconversion towards future needs

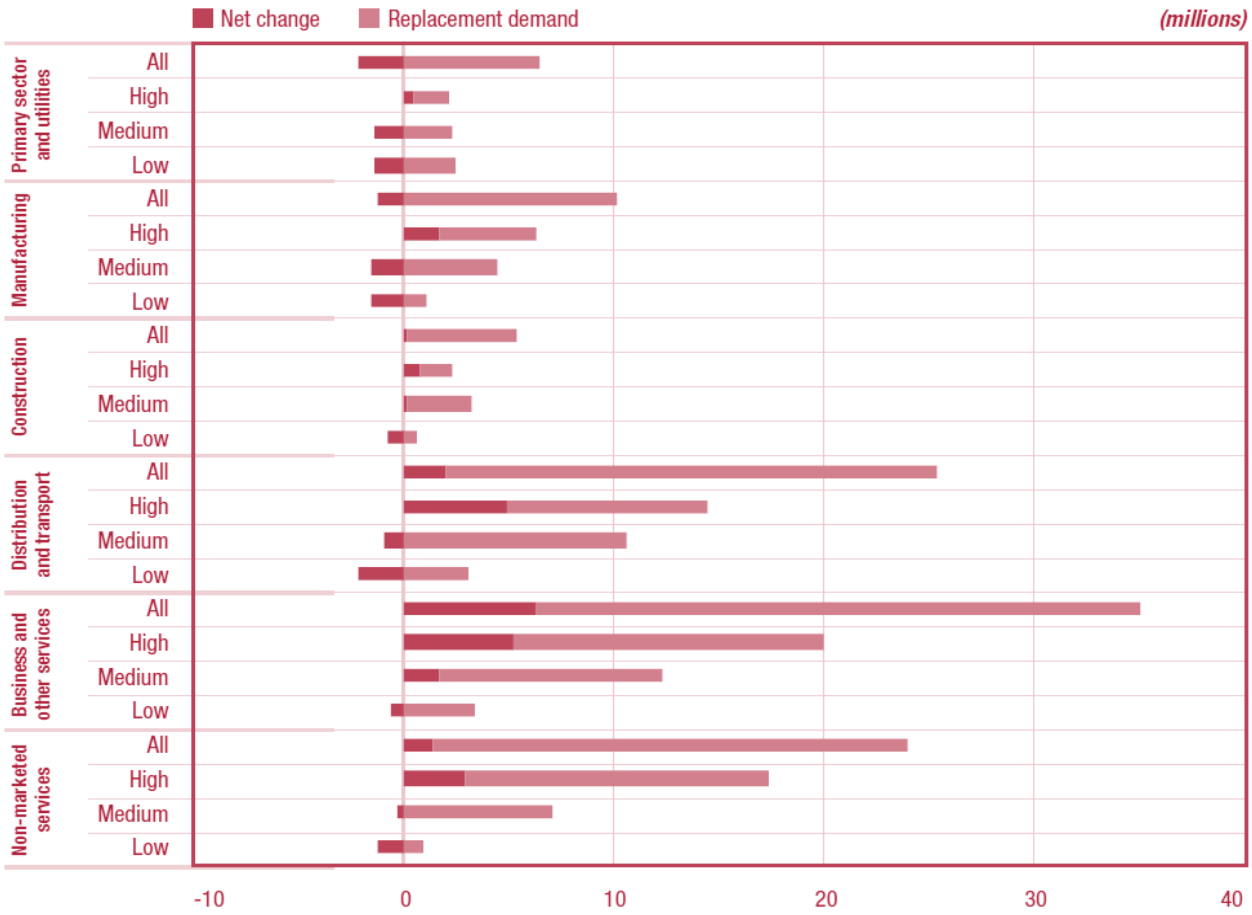
Skill surpluses arise when the demand for certain competences and experience falls. For instance, this could occur following an economic downturn, when the number of available jobs decreases, and particularly those related to manual trades. The major concern regarding future needs for skills in the construction sector, rather than focusing on the emergence of new activities, seems to be critically oriented towards the issue of the transformation of the existing skills. In essence, the emergence of new activities requires the existing set of skills in the industry to adapt and transform to meet the requirements of the new processes, practices and technology.

According to CEDEFOP, in 2025, more than half of the jobs in construction will be for craft and related trades workers. The sector is forecasted to experience increasing skill demand, with some 13% employed as technicians and associate professionals in 2025, compared to 11.5% in 2015. Skills needed in construction are likely to change to meet demands for “green” and energy efficient buildings that follow new designs and use new materials, as well as digitalisation trends. The forecast shows that demand for people with high-level qualifications could double, to account for one third of all jobs in construction by 2025[62].

[61] UEAPME, Business Europe, CEEP. The cost-effectiveness of apprenticeship schemes, 2016. https://be-extranet-prod.s3.amazonaws.com/publications/2016-05-27_employers_final_report_on_apprenticeships.pdf

[62] CEDEFOP, European Sectoral trends, the next decade, 2016. https://www.CEDEFOP.europa.eu/files/8093_en_0.pdf

Figure 15: Qualification needs in total job openings by sector (EU28), 2015-2025



Source: CEDEFOP skills forecast, 2016

As described in the Chapter 3. Drivers and skill needs, a transformation is already taking place both in employers and employees within the EU construction sector. The shift in the needs for skills due to technology, processes, and product enhancement as well as other external factors, such as environmental considerations, have created an emergent demand for new skills and a skill gap as the workers are unable to meet them with their existing skill-base.

3. Drivers of skill acquisition

Resource efficiency, digitalisation and OSH have emerged as the most influential drivers of skill acquisition.

The main drivers of skill acquisition require the construction workforce to acquire and develop competences that will allow it to reap the benefits offered by sustainable construction, digital technologies and increased safety mechanisms. Hence, increasing emphasis is placed on skills such as management, planning, numeracy and communication skills, as well as Information Communication and Technology (ICT), renewable energy and EE skills. Aligning the competences of the workers to the requirements imposed both by policy drivers and market demand will ultimately result in a more productive, profitable, competitive and sustainable construction sector. This chapter therefore analyses the main trends and drivers for future skill needs in the European construction sector of 2020 and beyond.

3.1 Energy and resource efficiency

This section summarises policy and societal developments, which make energy and resource efficiency measures an entire part of the construction sector, and present some of the recent requirements and standards for buildings and construction, including for instance the concept of Design for Disassembly[63]. In doing so, this section highlights the need to shift the approach to construction and construction skills, to adjust to these recent policy and market changes.

The impact of climate change has become increasingly important and gained traction in the international political but also economic stages in the past few decades[64]. To meet the challenges and transition to a low-carbon climate resilient economy, Europe and European MS are increasingly paying attention to climate change mitigation and adaptation measures. Hence, in November 2018, the EC presented its long-term strategic vision to reduce greenhouse gas (GHG) emissions[65]. In its vision it emphasised the need for energy efficient solutions and smart and adequate infrastructure. For example, the retrofitting of existing infrastructure can ensure long-term sustainable use, while the replacement of old infrastructure can be compatible with decarbonisation activities.

To create a conducive regulatory environment for the promotion and development of this area, action has been taken both at the EU and national level. Indeed, EU policies aim to encourage MS to decrease the energy consumption of the national building stock and stimulate their conversion from energy consumers to energy producers through retrofit measures and renewable energy sources (RES). In this context, the main EU legislative instruments relevant to sustainability and EE, which will predominantly affect the need for specialised skills in the European construction sector, include the following:

1. **The Energy Efficiency Directive (EED)** (Directive 2012/27/EU) sets a 20% energy savings target to be achieved by 2020. In accordance with the Directive, MS are required to submit National Energy Efficiency Action Plans (NEEAPs) every three years starting from 2014, as well as establish a long-term strategy beyond 2020 for mobilising investment in the renovation of residential and commercial buildings. Ultimately, MS must ensure that 3% of the total floor area of buildings owned

[63] Recycled Buildings: How to Design for Disassembly, https://archinect.com/features/article/150067785/recycled-buildings-how-to-design-for-disassembly

[64] Intergovernmental Panel on Climate Change (IPCC), Summary for policy makers, 2018. https://www.ipcc.ch/sr15/chapter/summary-for-policy-makers/

[65] See more information at: https://ec.europa.eu/clima/sites/clima/files/long_term_strategy_brochure_en.pdf

and occupied by its central government is renovated each year, starting in 2014[66]. In 2018, the **new amending Directive on Energy Efficiency** (Directive 2018/2002/EU) was adopted to update the policy framework to 2030 and beyond. The EU agreed on binding targets, including reducing our energy consumption through improvements in EE by 2030 by at least 32.5%. This means, that the EU's primary energy consumption should not exceed 1237 Mtoe and 956 Mtoe of final energy. The Directive entered into force in December 2018 and needs to be transposed into national law by MS by 25 June 2020, except for metering and billing provisions, which need to be transposed by the 25 October 2020. Further elements in the amended Directive are stronger rulings on monitoring the efficiency levels of new energy generation capacities.

The new amending Directive on Energy Efficiency (Directive 2018/2002/EU) aims to reduce the energy consumption by at least 32.5% by 2030 by further improving the energy efficiency.

2. **The Energy Performance of Building Directive (EPBD)** (Directive 2010/31/EU) introduces the concept of Nearly Zero Energy Buildings (nZEBs) and establishes that all new buildings should be nZEBs from 31 December 2020 (and all public buildings already need to be nZEB from 31 December 2018). Moreover, it requires the definition of new minimum energy performance requirements (for new buildings and major renovations), applying a cost-optimal calculation. The revised Energy Performance of Buildings Directive (EU) 2018/844 entered in force in July 2018 aims to promote smart technologies (installation of building automation and control systems); includes energy performance certificates (introduced by the Energy Performance of Buildings Directive 2002/91/EC), which must be issued when buildings are sold or rented; and incentivise EU MS to provide national financial measures to improve the EE of buildings[67].

The Energy Performance of Building Directive (EPBD) establishes that all new public buildings should be nZEBs as from 31 December 2018 and all other buildings as from 31 December 2020.

3. **The Renewable Energy Sources Directive (RES)** (Directive 2009/28/EC) establishes a common framework for the promotion of energy from renewable sources. It recognises information and training gaps, especially in the heating and cooling sector, which are addressed through provisions regarding the information and training of all relevant actors, including builders and installers. Thus, under the Directive, MS are responsible for ensuring the introduction of certification schemes for installers of small-scale biomass boilers and stoves, solar photovoltaic and solar thermal systems, shallow geothermal systems and heat pumps. The **revised Renewable Energy Directive** 2018/2001/EU came into force in December 2018 and includes a 32% target by 2030, (whereby 32% of the EU energy needs should be satisfied by renewable energy).

By 2030, 32% of all the EU energy needs should be satisfied by renewable energy.

These policy initiatives were further completed by other horizontal measures such as the New Circular Economy Action Plan[68], which specifically targets the construction and building sector. In fact, this Communication mentions the upcoming new "comprehensive Strategy for a Sustainable Built Environment", which will support inter alia the recyclability, durability and adaptability of built assets. Together, these policy initiatives offer a large potential opportunity for the construction sector. Not only will these policies push the construction sector to do more, but to do differently, through the integration of new technologies and innovations. These will allow increasing EE and improve building quality (especially when it comes to renovation type of work). In turn, these new technologies and approaches require knowledge particularly

[66] European Commission, Proposal for a Directive of the European Parliament and Council amending Directive 2012/27/EU on energy efficiency, 2016. http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1485938766830&uri=CELEX:52016PC0761

[67] Directive (EU) 2018/844 of the European Parliament and of the Council of 30 May 2018 amending Directive 2010/31/EU on the energy performance of buildings and Directive 2012/27/EU on energy efficiency, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv%3AOJ.L_.2018.156.01.0075.01.ENG

[68] European Commission, A new Circular Economy Action Plan, 2020. https://ec.europa.eu/environment/circular-economy/index_en.htm

due the integration of new products, materials and processes, such as standardisation and common voluntary certification of buildings and the application of digital technologies such as BIM.

The move towards an energy efficient and sustainable building sector hence constitutes one of the primary drivers for future labour and skill needs. Beyond attracting investments and offering significant market opportunities, these policy frameworks, requirements and market developments are expected to generate more and better jobs.

The renewable energy industry already contributed to the creation of 1.2 million jobs[69] in Europe and is expected to employ up to 2 million people by 2020, with most new jobs being created in the construction sector.

EE measures, including through the renovation of the EU building stock, which contributes for approximatively 40% of energy consumption and 36% of CO_2 emissions, are expected to create 400,000 new jobs[70]. Skill developments are also affected as further developed in the section below. As a result, 3 to 4 million workers will require training on EE[71].

The most prevalent barrier hampering the development of energy efficient construction sector, however, is the lack of adequate construction skills. It is crucial to improve the skills of middle- and senior-level building professionals and expand the knowledge in the area of sustainable energy efficient construction practices[72]. As such, the upskilling of the construction sector throughout the entire value chain (from e.g. professions such as designers, architects, engineers, installers and technicians) is of prime importance.

The (sustainable) construction industry of tomorrow will demand *"digitally literate, multi-skilled, diverse and highly trained installation and assembly practitioners capable of operating in different environments, and technically proficient professionals capable of managing product integration and complex logistics aligned with the ability to collaborate, and to co-ordinate both site installation technicians and facility-based manufacturing teams".*

Construction Leadership Council (2019). Future Skills Report.

Hence, to bridge the gap between policy and practice, several initiatives have been developed with a view to upgrade and/or set up large-scale qualification and training schemes. In turn, this is expected to address the demand for skilled building professionals, and boost Europe's economic competitiveness. The BUILD UP Skills initiative plays a key role in this process being a frontrunner of skills in energy efficient construction (Box below).

[69] Environmental and Energy Study Institute, Jobs in Renewable Energy, Energy Efficiency, and Resilience, 2019. https://www.eesi.org/papers/view/fact-sheet-jobs-in-renewable-energy-energy-efficiency-and-resilience-2019

[70] European Commission, Towards reaching the 20% energy efficiency target for 2020, and beyond. February 2017. https://ec.europa.eu/commission/presscorner/detail/sv/MEMO_17_162

[71] European Commission. A Blueprint for Sectoral Cooperation on Skills, https://ec.europa.eu/social/main.jsp?catId=1415&langId=en

[72] Research EU: Results pack on construction skills, 2018. https://op.europa.eu/en/publication-detail/-/publication/11ec9f62-6222-11e8-ab9c-01aa75ed71a1/language-en/format-PDF/source-115891710

Box 1: BUILD UP Skills Initiative

BUILD UP skills initiative

BUILD UP Skills is a flagship EU initiative aiming at equipping building professionals with the skills needed for the energy transition. It focuses on increasing the number of qualified professionals by developing national qualification platforms and roadmaps and providing training in the field of energy efficiency and renewable energy in buildings. BUILD UP Skills is running since 2011 and is built around the following pillars:

1. Development of national skill roadmaps;
2. Implementation of national skill roadmaps: design and implementation of new qualification and training schemes and/or upgrade of existing schemes;
3. Supporting multi-country qualification and training schemes, as well as measures boosting the demand for skilled professionals.

EU funding is provided through open call for proposals (total funding of EUR 40 million as of January 2020).

BUILD UP Skills created skill roadmaps for 30 countries (EU28, Norway and North Macedonia) and funded 68 projects, through which more than 32,000 building professionals and workers are expected to be trained by 2022[73].

The assessment of Pilar II confirmed the relevance of the initiative to the needs of MS found during Pillar I stage. The developed training courses aimed to tackle the skill gaps and needs, and therefore their relevance was built-in. Projects considered customer feedback relating to the nature of the training courses, delivery style and timing. BUILD UP Skills projects boosted education and training of craftsmen and other on-site construction workers and system installers in the building sector and increased the number of qualified workers across Europe. All projects developed and piloted new qualifications and training schemes and/or upgraded existing ones. Most projects have achieved the targets they initially set.

Based on its success and timeliness, BUILD UP Skills initiative could be considered a good practice at EU level as first successful policy and implementation project focusing on skills needs in construction.

Source: *Final report on the assessment of the BUILD UP Skills Pillar II*[74].

The section below further elaborates on the set of skills needed throughout the construction value chain.

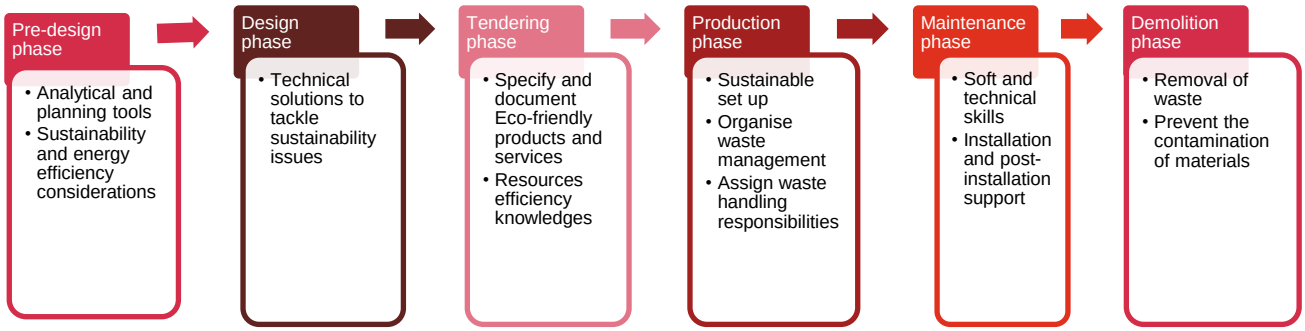
Skill needs throughout the construction process

The stringent EE targets and increasing demand for sustainable construction solutions are expected to bring a transformation of the skills required during all stages of the building process, from planning to design, production, maintenance and renovation and finally demolition (Figure 16).

[73] BUILD UP skills, BUILD UP skills in numbers, https://ec.europa.eu/easme/sites/easme-site/files/infographic_skills_in_numbers.pdf

[74] European Commission, Final report on the assessment of the BUILD UP Skills Pillar II, 2018. https://www.buildup.eu/sites/default/files/content/bus-d4.4finareport_on_assessment_april_2018_0.pdf

Figure 16: Skill needs across the construction process



At the **pre-design phase** of the project, requirements and existing conditions are identified, and any essential information that will inform the design process is uncovered[75]. Common activities include preparing a building programme and conducting a site analysis. Although sustainability and EE aspects have traditionally been incorporated in the design and operation parts of the building process, construction professionals involved at this stage will increasingly be required to develop skills related to the use of analytical and planning tools to take into account such elements, thus being able to assess and balance environmental, economic and legal factors that characterise a specific construction project. Therefore, professionals will be required to have knowledge about any relevant climate considerations, appropriate passive sustainable design strategies and environmental resources to be considered in the design phase, as well as an understanding of the energy performance goals of the final construction.

During the **design phase**, the specifications of the projects are defined by integrating inputs from all parties and from the earlier stage. Given the increasingly sustainable orientation of this phase, it will be essential for designers to incorporate aspects such as EE, waste management, recycling of materials, resource management, climate change adaptability and health and safety in their decision-making process. Consequently, all professionals involved in this stage, from designers and architects to civil engineers, will need skills related to the technical solutions necessary to tackle and address such sustainability issues, for instance ensuring the final construction includes the necessary infrastructure to face long-term climate change challenges such as the increase in rainfall and flooding. In addition, the use of digital tools such as BIM will require designers, architects and civil engineers to upskill in order to exploit the full potential of these tools[76].

Being able to specify and document how sustainable and environmentally-friendly products and services are procured will be an important future competence for contractors in the **tendering phase**, particularly given the growing attention put on "green" public procurement as a means of reducing the environmental impact of the construction sector. This trend is particularly evident in countries such as Sweden and the Netherlands, where contracting authorities put requirements on the specifications of contracted goods and services. Thus, to align with this tendency, contractors will increasingly need skills and knowledge related to resource efficiency during the design and construction phases, including waste minimisation and reuse of construction materials.

Similarly, during the actual **production phase**, the contractor will increasingly need to be knowledgeable and skilled concerning the sustainable set up of the construction site and preparatory activities, being able to organise waste management and assigning responsibilities for waste handling to the workers. Moreover, following handover, the contractor will need to demonstrate that sustainability requirements have been

[75] Autodesk Sustainability Workshop, Project Phases & Level of Development. https://sustainabilityworkshop.autodesk.com/buildings/project-phases-level-development

[76] BIM-based EU-wide Standardized Qualification Framework for achieving Energy Efficiency Training, https://www.list.lu/en/research/project/bimeet/

met. Therefore, site workers need to be trained to develop the necessary skills to carry out sustainable construction practices on-site, whereas managers will be required to have the (sometimes digital) skills to be able to sustainably organise the logistics of the construction process[77].

The **maintenance/refurbishment phase** is the most crucial in terms of skill needs, due to the stringent renovation requirements and policies measures seeking to stimulate the transformation of existing buildings. Indeed, the size of the EU energy renovation market is expected to grow significantly, following the EU ambition of achieving 32.5% energy saving by 2030 (as per the EU Directive on Energy Efficiency). For instance, in case of a 40% energy saving adopted by the EU, the energy renovation market could increase by almost 50% until 2030, being worth about EUR 122 billion, creating approximately 988,200 additional jobs and cutting down GHG emissions by 62.9% in the residential and by 73% in the non-residential sector[78]. The increasing importance of maintenance and renovation in the construction market will therefore require a highly qualified workforce, both from a technical perspective but also in terms of soft skills. Thus, some of the key skill needs will include effective communication with clients regarding energy efficient renovation, installation of energy efficient building automation systems, post-installation follow-up services and enhanced cooperation among all professionals involved in this stage.

Finally, new skills will be increasingly needed at the **demolition phase** during the dismantling, reuse, recovery or disposal of building materials. Consequently, workers skilled in the removal of waste from the site and in detecting leakages, pollution and emissions will be particularly sought-after in order to prevent the contamination of materials while project managers should provide the overall strategy and strategic knowledge to instruct and train the workers.

Training needs in energy efficiency by occupation

Given the policy drivers described above and considering the fact that the building sector accounts for 40% of the final energy demand in the EU, it is evident that sustainable construction and EE open up significant market opportunities for EU construction companies.

Nevertheless, these can be reaped only if a suitably skilled and qualified workforce is available. Indeed, according to the EC, **3 to 4 million construction workers** in Europe will need to increase their skills in the building sector in relation to EE, stressing the pivotal role of dedicated training[79]. Moreover, it has been estimated that retrofitting of existing homes generated over 0.8 million jobs in Europe in 2015[80]. Other estimates assess that retrofit programme could help create around 2 million jobs[81]. The jobs created refer to inter alia energy auditors, certifiers, inspectors of heating systems and renewable technology installers.

77 Danish Technological Institute, Future Qualification and Skills Needs in the Construction Sector, 2009. http://ec.europa.eu/DocsRoom/documents/5046/attachments/1/translations/en/renditions/native

78 European Parliament, Boosting Building Renovation: What potential and value for Europe?, 2016. http://www.europarl.europa.eu/RegData/etudes/STUD/2016/587326/IPOL_STU(2016)587326_EN.pdf

79 European Commission. A Blueprint for Sectoral Cooperation on Skills. https://ec.europa.eu/social/main.jsp?catId=1415&langId=en

80 European Commission. Turnkey Retrofit project, 2019. https://www.buildup.eu/en/explore/links/turnkey-retrofit-project

81 European Insulation Manufacturers Association, Deep Renovation. https://www.eurima.org/energy-efficiency-in-buildings/deep-renovation.html

Box 2: Demand for energy efficiency training

Looking at the demand by type of occupations, the trend across the EU indicates that the highest numbers of workers needing to be trained on energy efficiency and renewable energy are found in the following professions:

- ✓ **Electricians**
- ✓ **Plumbers** (including installers of heat pumps boilers, biogas systems, central heating, sanitary and thermic equipment)
- ✓ **Carpenters and joiners**
- ✓ **Bricklayers**
- ✓ **Technicians** (including Heating, Ventilation, and Air Conditioning - HVAC)

Training needs can vary between countries, both in terms of the occupations for which additional training is required to meet 2020 energy targets, and in terms of the share of the total workforce requiring additional training. For instance, in countries such as Bulgaria, the currently low level of introduction of energy-efficiency buildings implies that the entire construction workforce should be trained on the basic principles of EE by 2020, without particular differences between occupations. Similarly, in Spain, up to 100% of the workforce is estimated to require extra skills in EE and RES until 2020.

In Greece, the professions with the highest number of workers estimated to require training by 2020 to reach the EE targets are mostly aligned with the broader EU trend. Thus, up to 86,000 building frame workers, 98,500 building finishers - which includes roofers, plasterers, glaziers, plumbers and HVAC technicians – and 14,500 electrical equipment installers and repairers will need to be trained by 2020. Likewise, in Belgium, bricklayers, joiners, roofers, plasterers and glaziers report the largest EE and RES training needs (specifically 6,400 bricklayers and joiners and 2,800 roofers and 2,500 plasterers and glaziers). In the United Kingdom, the estimated numbers of the blue-collar workforce requiring training are also in line with the overall trend, and include 52,000 plumbers and heating, ventilation, and air conditioning (HVAC) technicians, 39,000 electricians/electrical fitters, 28,000 carpenters and joiners, and 12,700 glaziers/fitters[82].

3.2 Occupational safety and health

Developments in OSH in construction have an impact on the attractiveness of the sector and on the retention of the older workforce in employment. Indeed, the construction sector represents one of the riskiest working environments, as it involves work with heavy machinery, work at height, exposure to a variety of dangerous substances and more. Work is often physically demanding, raising the risk for a range of work-related long-term health issues[83]. Therefore, the improvement in OSH – beyond ensuring mental, physical and emotional well-being of employees, could be an important driver for the sector's development and by extension for skill acquisition.

The recent survey confirms that three forth of construction companies have issues following OSH requirements. Moreover, it is estimated that 40% of workers do not work safely. This translates into a need of 60% increase of OSH related training for construction industry[84].

The topic has gained importance at the EU level with the 2017 Communication on the Safer and Healthier Work for All - Modernisation of the EU Occupational Safety and Health Legislation and Policy. Building on

[82] European Commission BUILD UP Skills – EU overview report, 2014. https://ec.europa.eu/energy/intelligent/files/library/doc/overview-report.pdf
[83] European Commission, TG2 Meeting, Thematic Group 2 "Skills and Qualifications" 12th November 2018
[84] H&S Blueprint for Sectoral Cooperation on Skills: Construction, Presentation at the 1st stakeholder meeting, 03 October 2019.

existing EU directives[85] and other legislative provisions ensuring high standards of OSH on the workplace, the communication called for their modernisation. Considering new realities of employment and social systems in the EU, Communication defined three key actions for modernisation:

1) Stepping up the fight against occupational cancer through legislative proposals accompanied by increased guidance and awareness-raising;
2) Helping businesses, micro-enterprises and small and medium size enterprises (SMEs), follow OSH rules;
3) Cooperating with MS and social partners to remove or update outdated rules and to refocus efforts on ensuring better and broader protection, compliance and enforcement on the ground"[86].

Further, in 2018 the Blueprint for Sectoral Cooperation on Skills for Construction sector included OSH as one of the principal areas of development. Based on this, the analysis of current and anticipated skill needs in terms of OSH concerning emerging "green" jobs was launched in 2018. The analysis aims at 1) assessment of the needs for the revision of occupational profiles, 2) identification of good practices at regional, national and EU level, 3) development of a training proposal in OSH adapted to new needs of "green" profiles, and 4) creation of a more positive image of the sector, which proactively addresses OSH issues.

These proposed actions are expected to have a positive impact on the construction sector's employment conditions. Considering the large share of SMEs in the sector, and specifically micro-enterprises, supporting the compliance with safety and health rules (while helping businesses covering OSH risks) could play an important role for the overall positive boost of working conditions. At the same time, it is important to note that these types of enterprises have limited resources, preventing them to implement safer working methods[87]. In line with the above, the study "Development of an EU framework to assess the overall impacts of OSH prevention on the performance of construction enterprises" was launched in 2019. Its main objective is to improve the implementation of health and safety standards on the workplace by developing a taxonomy of prevention measures and developing a framework to measure their financial viability for employers. The study results are planned to be published in a handbook targeting companies, to facilitate the implementation of OHS measures.

The risks related to musculoskeletal disorders are particularly relevant for the construction sector. In fact, these disorders represent around 60% of all work-related health issues in the EU, also accounting for 60% of sick leaves and cases of permanent incapacitation to work. This category of risk is covered by several EU directives, which include specific provisions for the manual handling of loads and work with vibration and impact the construction sector specifically[88]. Updating and removing outdated practices, as well as facilitating businesses compliance with the standards are the underlying principle of the actions aforementioned.

While there has been a steady reduction of work-related accidents in the construction sector in the past 10 years, it remains one of the riskiest sectors, recording one of the highest number of accidents per hours worked. In Belgium, for instance, this corresponds to 55 accidents per million hours worked, compared to an average of 35 from other professional activities[89]. In recent years, the topic's importance has increased in connection to the challenges posed by the employment of EU foreign nationals, posted workers and third-

[85] These include inter alia Directive 89/391/EEC Occupational Safety and Health Framework; Directive 90/269/EEC on Manual Handling of Loads; Directive 92/57/EEC on Temporary or Mobile Construction Sites; Directive 2009/148/EC on Exposure to Asbestos at Work

[86] European Commission, Safer and Healthier Work for All - Modernisation of the EU Occupational Safety and Health Legislation and Policy, 2017. https://ec.europa.eu/social/BlobServlet?docId=16874&langId=en

[87] Ecorys, Development of an EU framework to assess the overall impacts of occupational health and safety (OSH) prevention on the performance of construction enterprises, 2019. https://ciat.org.uk/uploads/assets/59fb4dbe-101f-4252-8f36ba7e737b79f1/background-document.pdf

[88] Ibidem.

[89] Confederation Construction, Rapport Annuel 2017-2018, http://cms.confederationconstruction.be/Portals/0/Jaarverslag%20FR_LR.pdf

country nationals. Difficulties in communicating safety guidelines or enforcing workplace safety standards place these workers in a vulnerable position[90].

According to the International Safety and Health Construction Coordinators Organization (ISHCCO), clients, employers and contractors all have an equally important role to ensure and improve safety at work and implement a "culture of prevention". Raising awareness beyond the sector, as well as including prevention measures in pre-construction plans could substantially improve the situation[91].

Overall, several EU-wide initiatives were launched recently to improve the skills and coverage of OSH good practices across the EU. The challenge remains awareness raising and uptake among the construction companies.

3.3 Market driven innovation

Besides the policies and regulations driving the skill development needs, market demand for innovative approaches also drives the need for skills. Our analysis looks into how the uptake of digitalisation, artificial intelligence (AI), cloud services, robots, Internet of Things (IoT) and productivity pressures influence the sector in terms of skills and the need for upskilling. The rising consumer demand for innovative isolation materials, smart temperature control at home and more fuels the development of new skills across the sector.

The advent of digital technologies is set to bring about the "disruption" of the construction sector, having the potential to drastically change the way of doing business. Indeed, according to a recent industry survey, 93% of construction companies believe digitalisation will affect each of their processes, although in different ways depending on the different actors in the sector. For manufacturers of building materials, digitalisation will mainly be relevant for production and distribution, whereas for construction companies it primarily affects planning, construction and logistics, with BIM being one of the technologies with the greatest potential. As for building material traders, digitalisation is particularly focused on sales, with online trading becoming a crucial part of their operations[92].

The digital transformation and market driven innovation is described by the EC as being characterised by a fusion of advanced technologies and the implementation of physical and digital systems, which impact the EE and building sector in a smarter way.

> ***"We have to make our single market fit for the digital age, we need to make the most of artificial intelligence and big data, (…) we have to work hard for our technological sovereignty."***
>
> *President Ursula von der Leyen*

Although the construction sector faces various challenges relating to the adoption and integration of new digital technologies, research shows that there is a growing awareness and interest in digitalisation, driven by the potential for productivity and efficiency gains[93]. In fact, there are already a wide range of technologies used by construction enterprises, ranging from BIM, 3D Printing, drones, robotics, Internet of Things, AI etc. However, public support remains important, especially at the early stages of technology integration. In this context, various EU-wide policies and measures were developed to facilitate the digitalisation of skills in the construction sector.

---

90 European Commission, TG2 Meeting, Thematic Group 2 "Skills and Qualifications" 12th November 2018

91 Ibidem.

92 Roland Berger, Digitization in the construction industry, 2016. https://www.rolandberger.com/publications/publication_pdf/tab_digitization_construction_industry_e_final.pdf

93 CECE, Digitalising the Construction Sector: Unlocking the potential of data with a value chain approach, 2019. https://issuu.com/cece_europe/docs/final_nobianche2-ied_consulting_-_f

In particular, **Digital Europe**, which is planned to be part of next Multiannual Financial Framework (MFF) 2021-2027, plans to provide EUR 9.2 billion for the deployment of digital technologies. While it covers several areas including inter alia supercomputing, AI, cybersecurity, EUR 700 million are dedicated to advanced digital skills. This component will support: i) the design and delivery of short-term courses and training for entrepreneurs and the workforce; ii) the design and delivery of long-term training and master's courses for students and the workforce and; iii) on-the-job training and traineeships for students, young entrepreneurs and the workforce[94]. The EC has established the **Digital Transformation Monitor**, aiming to identify key trends in digital transformation. It measures progress which has been made at national and sector specific level. A monitoring mechanism allows to examine key trends in digital transformation, such as the evidence on the pace of digital transformation particularly in the construction sector across all EU countries. The Industry 4.0 strategy, and more generally industrialisation strategies of EU MS often include a digital innovation and technology component, which may focus on the construction sector[95].

While the digitalisation agenda applies to a wide range of sectors, some policies and initiatives focus on the construction sector. This is the case of the European Commission **Construction 2020 Strategy[96]**, which dedicates a thematic objective (TO) to the digitalisation of the construction sector (TO1), and another to improving the human capital basis (TO2). Regular meetings convening all the major EU construction stakeholders are organised to exchange knowledge and share good practices and lessons learnt, discuss relevant trends and their underlying opportunities and challenges, and elaborate relevant policies and programmes at the EU level. The EC also launched the Blueprint for Sectoral Cooperation on Skills, which integrates a focus on digital skills (more details in the sections below). Last, the EC's Executive Agency for Small and Medium-sized Enterprises (EASME) also organised the **international BUILD UP skills workshop** recently, which was held in the framework of CONSTRUMAT '19 in Spain. The workshop aimed at promoting the upskilling of the construction workforce, especially in the context of the integration of digital technologies[97]. Finally, the EU also funds the **DigiPLACE**[98], led by the Politecnico di Milano together with 19 European partners from 11 countries. With a budget of EUR 1 million, it aims at assessing the feasibility of a European Digital Platform for Construction, which would integrate several digital technologies, applications and services. In doing so, the DigiPLACE would create a common ecosystem of innovation, standardisation and commerce with the aim to increase the productivity of the sector and the quality of its end products.

However, while digital technologies can transform the construction sector and contribute to its sustainable development, there is a common recognition that such a full potential cannot be captured without a skilled construction workforce.

Standardisation and industrial scaling – offsite construction

One of the most promising technological trends currently acting as a primary driver for skills relates to the standardisation and industrialisation of the building process. This is enabled by so-called Modern Methods of Construction (MMCs), a wide range of technologies including offsite construction (or off-site modular assembly), which consists in assembling buildings from prefabricated components manufactured offsite and employing standard and reusable product catalogues (i.e. libraries containing design templates like

[94] European Commission, Digital Europe Programme: a proposed €9.2 Billion of funding for 2021-2027, 2019. https://ec.europa.eu/digital-single-market/en/news/digital-europe-programme-proposed-eu92-billion-funding-2021-2027

[95] See for example the Industrial Strategy "Building a Britain fit for the future" of the United Kingdom, 2017. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/664563/industrial-strategy-white-paper-web-ready-version.pdf

[96] European Commission, Strategy for the sustainable competitiveness of the construction sector and its enterprises, 2012. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52012DC0433

[97] Proceedings of the event : https://www.buildup.eu/sites/default/files/bus_document_eu_meeting/finalreport.pdf

[98] See more information at: https://www.digiplaceproject.eu/

datasheets and equipment lists)[99]. Offsite construction encompasses four main types of assembly, namely small-scale components (e.g. light fittings, windows), large scale modules and panelised systems, individual units/rooms and complete buildings.

Offsite construction is increasingly technology-driven, relying on approaches and tools such as Design for Manufacture and Assembly (DFMA), Lean production, BIM and the Enterprise Resource Planning software. These digital tools are paving the way towards a real standardisation of construction and ensuing industrialisation of production. BIM links 3D design drawings to real-time scheduling, resource management and material pricing data, and is therefore a cost-effective way of planning, designing and controlling building projects. BIM can also be interfaced with tools like Enterprise Resource Planning, which reacts to updates in a BIM model with inventory status, incoming materials and labour schedules[100]. Therefore, the use of technology to allow for the standardisation and industrialisation of building processes and offsite construction entails important benefits, with some estimates pointing at a 20% reduction in project costs and a 20% to 50% shortening of completion times[101].

30% reduction in project costs and 40% shortening of completion times could arise from the use of technology.

Impact on skill needs – offsite

The transfer of site-based construction activities to an offsite "factory-like" environment may contribute to alleviating some of the industry's skill shortages.

Where offsite factories are built, there will be an increase in new employment opportunities for skilled trades, as well as the creation of new apprenticeships[102].

The offsite factory environment may enhance the appeal of the construction industry to both new entrants and experienced workers looking for an alternative to traditional site-based work. Moreover, the shift towards offsite construction may also provide the opportunity to fill the skill gap through other engineers and technicians working in similar factory-like environments across different industries, such as aerospace or automotive, since transferrable skills could be applied to offsite construction[103].

With regard to specific skills required by the advent of digital technologies and industrialisation, professions like carpenters and joiners will require honed assembly skills to assemble framed buildings to meet appropriate standards and achieve the adequate level of structural integrity and thermal performance. As for managers and supervisors, they will need the competences to appropriately incorporate offsite components with processes taking place onsite. Finally, architects will be requested to have coordination skills to oversee increasingly collaborative design processes[104]. In addition, the shift to off-site construction will create jobs for painters and decorators, steel erectors, logistics and non-construction operative[105].

These specific skills are functionally relatively unchanged compared to the current needs. Industrialisation of the building process and offsite modular construction will rather require professionals working in these

99 Aspentech, Business Standard - Streamlining Projects with a Modular Approach, 2016. https://www.aspentech.com/Industry-Perspectives/Business-Standard---Streamlining-Projects-with-a-Modular-Approach/

100 Medium, The benefits of turning housing construction into housing production, 2016. https://medium.com/sidewalk-talk/the-benefits-of-turning-housing-construction-into-housing-production-2513fffea933#.1okkqvohv

101 McKinsey. Modular construction: From projects to products, 2019 https://www.mckinsey.com/~/media/mckinsey/industries/capital%20projects%20and%20infrastructure/our%20insights/modular%20construction%20from%20projects%20to%20products%20new/modular-construction-from-projects-to-products-full-report-new.ashx

102 CITB. The impact of modern methods of construction on skills requirements for housing, 2019. https://www.citb.co.uk/global/research/citb-mmc-report-mar-2019.pdf

103 A. Knight, The industrialisation of construction, 2017. https://www.linkedin.com/pulse/industrialisation-construction-adam-knight

104 UK Commission for Employment and Skills (UKCES), Technology and skills in the Construction Industry, 2013. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/305024/Technology_and_skills_in_the_construction_industry_evidence_report_74.pdf

105 CITB. The impact of modern methods of construction on skills requirements for housing, 2019 https://www.citb.co.uk/global/research/citb-mmc-report-mar-2019.pdf

trades to adopt a more efficient, strategic and collaborative method of working, as opposed to developing completely new technical skills. For higher-level professionals in particular, managerial skills, and especially process management, will be progressively more crucial, with competences in site safety, risk management, sequencing and quality control being required as the building process becomes integrated with manufacturing functions. Furthermore, marketing and business development, planning and design will also be driven by offsite construction practices.

Nevertheless, it will be particularly crucial for the workforce to develop the ability to use information technology and other automated tools.

In France alone, estimates point towards the need to train up to 80,000 workers in BIM by 2020[106].

Moreover, BIM is now required in public procurement procedures in several EU MS, such as the United Kingdom, Denmark, or Italy. Appropriate skills are also needed to perform detailed and accurate 3D drawings in order for offsite construction to be carried out effectively. That is why the EU has also supported under the Horizon 2020 Research and Innovation Programme several projects aiming to mainstream BIM in the construction sector, such as BIMplement[107] (which targets nZEBs), BIMcert[108] (BIM certification), BIMEET[109] (which aims to develop skill matrices related to BIM and energy-efficiency), and Net-UBIEP.[110]

Managerial and technical skills will need to be increasingly intertwined, especially in higher level occupations, with construction professionals of the future being characterised by a balance of core soft and technical skills, but also relevant knowledge and evolving behaviours. In fact, aside from skills, knowledge regarding the importance of accuracy and precision, as well as awareness and comprehension of other roles and their interaction, will also need to be enhanced with the rise of offsite construction. For example, "*construction managers may be split between off site and on site construction; be required to understand the end-to-end process; and use the digital tools that can help them optimise delivery, as well as manage high-performing, multidisciplinary teams*"[111].

A detailed summary of the types of skills, knowledge and behavioural changes needed do respond to the digitalisation and standardisation of construction processes, and specifically offsite construction, is depicted in Table 2 below.

Table 2: Skills, knowledge and behaviours needed for offsite construction

	Offsite manufacture	Onsite placement and assembly	Logistics	Digital design
Technical skills	- BIM-enabled design - Health & safety - Relevant trade skills (joinery, plastering, operating site machinery, welding) - Lifting and handling - Machine plant operation - Measuring to precise specifications - Multiskilling (e.g.	- Health & safety - Relevant trade skills (joinery, plastering, operating site machinery, welding) - Laying groundworks - Lifting and handling - Machine plant operation - Measuring to precise specifications - Multiskilling (e.g. combination of	- Budget and financial management - Control and management of inventory - Digital skills (e.g. scheduling and specific IT) - Health & safety - Lifting and handling - Planning - Process management - Project management	- Building Information Modelling (BIM) - Computer-Aided Design (CAD) - 3D drawing - Creating 3D models - Developing a value proposition (cost, durability, low carbon, aesthetic)

106 See more information at : https://books.google.lu/books?id=aiCeDwAAQBAJ&pg=PT275&lpg=PT275&dq=to+80,000+workers+in+BIM+by+2020&source=bl&ots=spTTS_gX29&sig=ACfU3U0svds5LXlW7ZGwh08NcQcz9VL3dw&hl=en&sa=X&ved=2ahUKEwiPp_6DmMTmAhVSXsAKHZvaD0sQ6AEwAHoECAoQAQ

107 See more information at: https://www.bimplement-project.eu/

108 See more information at: https://cordis.europa.eu/article/id/411693-new-skills-certification-system-for-a-bim-savvy-construction-sector

109 See more information at: https://www.buildup.eu/en/explore/links/bimeet-project

110 https://cordis.europa.eu/article/id/411698-increasing-energy-efficiency-with-building-information-modelling

111 Construction Leadership Council Future Skills Report, 2019:12. http://www.constructionleadershipcouncil.co.uk/wp-content/uploads/2019/06/CLC-Skills-Workstream_Future-Skills-Report_June-2019_A4-Print-Version.pdf

	Offsite manufacture	Onsite placement and assembly	Logistics	Digital design
	combination of various technical skills)	various technical skills)	- Quality control	
Knowledge	- Appreciation of how buildings are constructed - Basic design - Degrees of tolerance/accuracy - Impacts for site if manufacture is at fault - Lean methodologies - New technologies e.g. 3D printing - Offsite manufacturing processes - Processes used to assemble buildings - Quality assurance - Relevant design codes and standards	- Degrees of tolerance/accuracy - Impacts for site if manufacture is at fault - Integrating onsite and offsite - Lean methodologies - Order of sequence - Processes used to assemble buildings - Quality assurance - Safe lifting and handling	- Appreciation of how buildings are constructed - Degrees of tolerance/accuracy - Integrating onsite and offsite - IT tools - Lean methodologies - Low carbon agenda - Offsite manufacturing processes	- Appreciation of how buildings are constructed - Current and emerging technologies - Degrees of tolerance/accuracy - IT tools - Lean methodologies - New technologies e.g. 3D printing
Behaviour	- Accuracy - Adaptability - Attention to detail - Effective and on-going - communication - Problem-solving - Process improvement	- Accuracy - Adaptability - Attention to detail - Effective and on-going - communication - Negotiation - Problem-solving - Process improvement	- Accuracy - Attention to detail - Business case for offsite - Commercial awareness - Customer service - Effective and on-going - communication - Negotiation	- Accuracy - Attention to detail - Business case for offsite - Effective and on-going - communication - Problem-solving - Team-working - Working to tight deadlines

Source: adapted from UKCES 2017[112].

Impact on skill needs – onsite

Another important aspect of standardisation and industrial scaling of construction processes is the distinction between the type of skills needed during offsite construction and the subsequent onsite assembly. The standardisation during the offsite stage will result in a need for specialists skilled in highly repetitive tasks. This can therefore lead to cost scaling in the future. Conversely, onsite assembly requires professionals able to assemble components manufactured offsite with a high level of situational awareness (i.e. knowledge of other jobs roles and their holistic interaction) (Figure below).

Figure 17: Overview of skill differences between offsite construction and onsite assembly

Source: adapted from UKCES, 2013.

[112] CITB, Faster, Smarter, More Efficient: Building Skills for Offsite Construction. 2017. https://www.citb.co.uk/documents/research/offsite_construction/offsite_construction_full_report_20170410.pdf

Moreover, the division between offsite and onsite activities will have an indirect effect on occupations like construction engineering, mechanical and electrical trades. The duration during which they will be needed in the process will be shorter, since the onsite assembly stage will be considerably faster. On the contrary, traditional onsite skills such as drainage and foundation work for site preparation will not be subject to major changes.

New technology is blurring the boundaries between traditional trades, with disciplines becoming increasingly interwoven, thus disrupting the role of traditional occupations in the new construction process. Therefore, greater flexibility, broadening of the current skill-base and multi-skilling are necessary as offsite construction becomes more widespread, given the need for increased precision and higher quality standards. Indeed, possessing a blend of skills will ensure that the workforce is aligned with technological advances, better prepared for more managerial positions and better equipped to react to any demand shocks in construction owing to its transferrable skilled. It will help companies to withstand the cyclicality of the industry.

A multi-skilled workforce can reduce total project costs by 5% and to decrease labour requirements by 35%[113].

In its European Construction Industry Manifesto for Digitalisation, the major European construction industry associations call for strong political leadership from the EU and budgetary focus on digital skills, R&D and IT infrastructure within the construction sector[114]. The manifesto stressed that while there have been several bottom-up initiatives set up by the construction industry to support the digital transformation in terms of skills, the access to and support of financial resources is still a challenge. If addressed, the skills transformation process would be significantly speed up, with increased level of investments that would mitigate the impact of initial low return on investments. Hence, the post-2020 MFF should primarily focus on mobilising finances to promote the assessment and identification of skills need within the digital construction sector and support quality training, up-skilling and re-skilling initiates - attracting young talent while avoiding minimising job losses. This is partly addressed by the Digital Europe initiative.

Risk of traditional skill shortage

While skill shortage is often assimilated to the emergence of new technologies and/or processes in the construction sector, much less attention is paid to traditional skills. The loss of such set of skills could notably impact the management, protection and conservation of the historic environment, which generates a consequent source of direct and indirect revenues and jobs (from e.g. tourism activities).

A survey covering the United Kingdom conducted by the Royal Institution of Chartered Surveyors (RICS) in 2019 shows that only 10% of 18-24-year-old participants were able to describe the job of a stones man and less than 15% understood work of a glassblower[115]. Recently in France, the reconstruction of Notre-Dame cathedral also raised the issue of human and skill resources, where traditional construction jobs are left behind[116]. At the same time, it became clear that the preservation of European cultural heritage requires supporting the supply of skills and training for the construction sector workers.

The provision of VET and other training integrated in college-based training can mitigate such an issue. An example for such initiatives is the Society for the Heritage of Ancient Buildings helping companies and individual to maintain and develop traditional skills through training schemes, courses and awareness raising campaigns[117]. Other recent initiatives include the Skills Investment Plan for Scotland's historic environment

[113] McKinsey Global Institute, Reinventing Construction: a route to higher productivity. 2017. http://www.mckinsey.com/~/media/McKinsey/Industries/Capital%20Projects%20and%20Infrastructure/Our%20Insights/Reinventing%20construction%20through%20a%20productivity%20revolution/MGI-Reinventing-Construction-Full-report.ashx

[114] See more information at: http://www.fiec.eu/en/library-619/joint-manifesto-on-digitalisation-from-the-construction-industry.aspx

[115] See more information at: http://www.constructionmanagermagazine.com/news/historic-buildings-uk-ris7k-ski7lls-shor7tage/

[116] See more information at: https://www.lemoniteur.fr/article/notre-dame-le-gouvernement-lance-l-operation-baptisee-chantiers-de-france.2033980

[117] See more information at: https://www.spab.org.uk/about-us

sector[118], which also recognised that a lack of appropriate skills is a threat to Scotland's cultural heritage and provides an action plan tackling this issue. In France, the government met with industry stakeholders such as the French Federation of Buildings, to train young students and graduates to these traditional professions. In other cases, such as the one presented in the Box below, the private sector took the lead in developing initiatives aiming to promote traditional skills.

Box 3: Supporting traditional construction skills in France

In France, an initiative driven by the private sector with the support of other companies and the national, regional and local institutions led to the creation of the Castle of Guédelon. The latter is a medieval-type of castle, which is being built since 1997, following traditional construction techniques, and using locally source materials.

One of the objectives behind the creation of the castle is to train construction workers in traditional skills, that are close to being forgotten. These include for instance: stone cutter, tile-maker, potter etc. Hence, the castle offers trainings to individual entrepreneurs, trainees and apprentices and the general public. Since 2000, the Castle of Guédelon is financially sustainable, with over 3.1 million visits every year, and about 100 employees.

3.4 Upskilling trend

Upskilling the workforce is a concept that has gained momentum in the past few years. The concept is the following: major changes (digitalisation, climate change, etc.) affect several industries, which are under pressure. Many suffer from massive layoffs due to the evolution of core skillsets, while simultaneously falling short in resourcing key jobs and/or areas that are critical to success[119].

According to an evaluation of the BUILD UP Skills initiative, 3 to 4 million blue collar workers will need upskilling in the area of the EE alone[120].

Moreover, the construction sector is among the least digitalised[121] and thus offers a huge potential to raise the efficiency of construction processes and the operation of buildings. The digital transformation in the construction sector will require a workforce upskilling and re-skilling.

Upskilling towards EE, innovation and safety should be done throughout the entire value chain of the construction sector, e.g. designers, architects, engineers and workers. All these professions need to be made aware of the new and upcoming processes related to the above-mentioned drivers. As such, upgrading or setting up large-scale qualification schemes in these areas go hand in hand with initiatives seeking to increase the demand for skilled building professionals and creating new job opportunities to promote overall European economic competitiveness:

- In June 2016, the EC adopted the **New Skills Agenda** to support human capital, employability and competitiveness. The Agenda emphasises 10 points of actions highlighting an "ambitious, long-term strategy to make sure people acquire the skills they need to thrive in the labour market and in wider society". The Agenda focuses on three key areas: (1) the improvement of the quality and relevance of skill formation; (2) the increase in visibility and comparability of skills and qualifications; and (3) the improvement of skills intelligence and information for better career choices.

118 See more information at: https://www.skillsdevelopmentscotland.co.uk/media/45467/historic-environment-sip.pdf
119 Probst (2019). Upskill! A 6 Step Solution to Sustaining Economic Opportunity for All. https://www.pwc.lu/en/upskilling-for-competitiveness-and-employability.html
120 BUILD UP Skills (BUS) initiative, http://ec.europa.eu/easme/sites/easmesite/files/bus_evaluation_executive_summary.pdf
121 McKinsey Global Institute industry digitisation index, based on 2015 or latest available data, 2016. https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/digital-europe-realizing-the-continents-potential

- Most notably, the Commission proposes a **Skill Guarantee** in the framework of the new skills agenda for Europe. It aims to support low-skilled people to acquire new skills allowing them to find employment and/or stay within their current work. It does so in three steps: 1) skill assessment; 2) learning offer and 3) validation and recognition. The financial support is provided through the European Social Fund (ESF), Erasmus+, Employment and Social Innovation (EaSi), European Regional Development Fund (ERDF), FEAD (Fund for European Aid to the Most Deprived), European Globalisation Adjustment Fund (EGF) or European Agricultural Fund for Rural Development (EAFRD).
- Similarly, the **Digital Skills and Jobs Coalition** is one of the ten key initiatives proposed by the EC as part of the New Skills Agenda for Europe. It aims to support the co-operation among education, employment and industry stakeholders aiming to develop large digital talent pool and ensure that individuals attain the necessary digital skills.
- The Commission, as part of the New Skills Agenda, put forward a **Blueprint for Sectoral Cooperation on Skills** to mitigate skill shortages in selected sectors. The construction Blueprint will support the collaboration of stakeholders (most importantly employers and VET providers) to work together at the EU level to identify skill needs and gaps and bring forward practical solutions to address those needs and gaps. It is expected that those solutions will be rolled out at national and regional levels.

Upskilling and re-skilling of the European workforce continued to be a major priority, as it is presented in the policy documents adopted by the Commission recently. The EC Communication on "A New Industrial Strategy for Europe"[122] acknowledge this topic as being a fundamental factor that will need to be properly addressed to make European industrial transformation happen.

The BUILD UP skills initiative, coordinated by EASME, was set up in 2011 to boost education and training in the construction sector. It primarily focuses on heightening the quantity of qualified workers across Europe and consequently promote the delivery of building renovations, such as high-energy performance and new, nZEBs. The BUILD UP Skills Evaluation Report from April 2018 concludes that "BUILD UP Skills has been a successful, relevant, unique and timely initiative"[123]. In many countries, similar training courses did not previously exist, neither were any efforts made to analyse the need for such skills or to bring together the relevant stakeholders. The projects have helped set the basis for education of construction workers, developed high quality and innovative materials, developed a good network and raised awareness among construction workers and policy makers of the importance of EE and market driven innovation such as BIM.

In such a context, an upskilling and requalification policy is proven to provide sustainable professional career development avenues to workers (see Box below). In other words, upskilling promotes the integration of new technologies in the European industries and enterprises by significantly altering the qualifications and skill requirements of major parts of the workforce. Even though it has so far not been applied to the construction sector, upskilling seems to be of utmost relevance when considering the current challenges of the sector.

[122] European Commission, A New Industrial Strategy for Europe, 2020. https://ec.europa.eu/info/sites/info/files/communication-eu-industrial-strategy-march-2020_en.pdf

[123] https://www.buildup.eu/sites/default/files/content/bus-d4.4finareport_on_assessment_april_2018_0.pdf

Box 4: Digital Skills bridge

Luxembourg **Digital Skills Bridge** aims to provide technical and financial assistance to upskill employees in companies facing major technological disruption.

It does so by:

1. Raising awareness and support companies whose business activities have or will be significantly transformed by digital disruption.
2. Coaching and upskilling employees – whose jobs will be impacted by the digitalisation – and advise them on new placement opportunities
3. Demonstrating the value of a proactive and preventive upskilling approach for companies, employees and society.
4. Developing an ecosystem of relevant assessment and upskilling solutions.

In particular, Skills Bridge assist employees in their competency assessment, and provide them with tailored guidance and trainings for the acquisition of new professional skills (often leading to recognised certifications). For companies, Skills Bridge represents an opportunity to remain competitive and innovative, access newly qualified staff and benefit from a positive image, which in turn helps building their reputation.

Source: https://www.skillsbridge.lu/

Some specific obstacles to workers' successful in-house training or upskilling come from the experiences of pioneering companies, which developed their own upskilling programmes. In the case of training for skills required for deep energy renovations and the delivery of quality nZEB, four obstacles were identified:

- Firstly, the lack of awareness of the benefits of low-energy buildings on the consumer side impacts the demand for such solutions. In turn, if there is limited market demand, construction firms will not be incentivised to engage in developing their labour's skills. Thus, EE solutions need to be communicated efficiently to consumers, in a way that helps build the market for this type of renovation work.
- Secondly, the availability of the right type of training may be an issue. The learning methods need to be adapted to be practical and hands-on. Other learning methods, which are traditionally used in other settings, such as lectures, presentations or written tests may pose an unnecessary challenge towards new skill acquisition.
- A lack of time and tight working schedules may become an obstacle to the organisation and participation in training. Commitment to dedicating time for training is crucial on the employer's side. Solutions for this have been tested with the implementation of mobile training wagons, available directly at the working site[124]. At the same time, hours spent on training can be perceived especially by small and micro enterprises as a loss of working hours, with no guarantee of return on investments. The economic crisis has put many SMEs in "survival" mode, forcing them to prioritise short-term work over long-term investments.

Not least, for firms participating in public procurement, procurement markets often favour "lowest price" instead of quality, thereby limiting the incentives for the investment in a highly skilled and professionalised workforce[125].

[124] BUILD UP Skills, Five Challenges to Upskilling Construction Workers, https://www.buildup.eu/en/news/five-challenges-upskilling-construction-workers

[125] BUILD UP Skills – EU overview report. June 2014. https://ec.europa.eu/energy/intelligent/files/library/doc/overview-report.pdf

4.
Obstacles to skill development

This chapter presents the main obstacles to skill development in the EU construction sector. A wide consensus across stakeholders exists over some long-lasting factors, which have been impacting the state of play of human capital in construction over time. Firstly, the chapter presents structural barriers and cyclical factors, which are the result of complex interactions between the business cycle, general economy and company behaviour. In turn, the report shows how this impacts the labour market, resulting in skill mismatches and shortages. Further influencing the state of skill development is the sector's image and the poor public perception of the construction profession. While these obstacles could be partly overcome with sound policy and strategic action, the suboptimal quality of the education and training offered to either aspiring young professionals or experienced employed workers also poses a serious challenge. Misalignment between the labour market demand for qualifications and competences and the VET framework can be damaging to the sector's overall development, contributing to the shrinking of the talent pool. Finally, the chapter discusses challenges related to skill recognition and their policy context.

4.1 Situational and structural barriers

While new technologies and EE requirements are driving the demand for skills in the construction sector, several factors act as **situational barriers** for skill development and acquisition. Factors such as demographic change (especially the ageing population), digital transformation and EE impact skill development in construction. Such impacts reinforce without timely and appropriate VET and apprenticeship programmes.

Investing in people, organisation and working culture, through continuous training and knowledge management have been identified as key factors for the development of competitive and innovative companies in construction[126]. Nevertheless, the narrow construction sector tends to be less engaged in the development of its human resources, compared to other economic sectors[127]. Together with the real estate, they are the sectors providing the least continuous vocational training hours in Europe, namely five hours per 1,000 hours worked[128] while the finance and communication sector provide more than double the amount of continuous training.

There are substantial variations among MS in terms of adult learning in narrow construction sub-sector, ranging from a 21.4% of adults participating in education and training in Denmark to 1.1% in Croatia and 1.2% in Bulgaria.

The overall low levels of continuous education and investment in skills and human resource development is linked to several structural and cyclical factors typical of the industry that foster a short-term approach to human skill development.

Among **structural challenges**, fragmentation of the market as well as low predictability of sector's development play the most important role.

[126] World Economic Forum, Shaping the Future of Construction, 2017 http://www3.weforum.org/docs/WEF_Shaping_the_Future_of_Construction_Inspiring_Innovators_redefine_the_industry_2017.pdf

[127] World Economic Forum, Shaping the Future of Construction, 2016. http://www3.weforum.org/docs/WEF_Shaping_the_Future_of_Construction_full_report__.pdf

[128] McKinsey Global Institute, Reinventing Construction: A Route to Higher Productivity, 2017. http://www.mckinsey.com/~/media/McKinsey/Industries/Capital%20Projects%20and%20Infrastructure/Our%20Insights/Reinventing%20construction%20through%20a%20productivity%20revolution/MGI-Reinventing-Construction-Full-report.ashx

The structural fragmentation of the construction sector plays a key role in limiting the skill development within the industry.

Indeed, across the EU, the construction sector is dominated by micro, small and medium-sized enterprises that often lack the financial and human capacity to invest sufficiently in the training of their employees. For instance, the apprenticeship training is often viewed as costly and inefficient, instead of as an investment into future skills. Furthermore, the fragmentation of the industry's supply chain leads to a lack of ownership of common challenges, such as skill shortage[129]. The lack of integration of the supply chain characterised using sub-contracting results in a heavy focus on costs as opposed to value, leading to negative repercussion on investment in human resources. Training initiatives are often implemented because of industry members' specific interest and are rarely conceived as joined efforts to the benefit of the entire sector. This is likely to pose a barrier to the successful uptake of upcoming digital and technological advances, such as BIM, as they require greater collaboration from the industry as a whole[130].

The construction sector is also subject to **cyclical factors**, which may turn into obstacles to skill development. Namely, construction is characterised by **low predictability**, as its business cycles depend on the ups and downs of the overall economy. Skill and labour shortages typically increase at times of economic growth. A discussion paper by the Institute of Labour Economics states that in times of economic expansion, "whether and how labour supply respond to rapid increases of demand depends on the distribution of existing skills, the extent of geographical mobility and the signals provided by wage adjustments"[131]. On the other hand, when the business cycle turns, two types of events impact the labour market. Skill mismatch between demand and supply may decline, since low quality jobs are sacked, while high quality jobs survive. At the same time, while companies post fewer vacancies, job seekers will tend to accept fewer desirable positions due to the higher competition in the face of lower vacancy availability[132].

Because of the low predictability that characterises the construction sector, a rising share of companies chose to apply a temporary employment model to their staffing strategy, using temporary job agencies to find short-term employees. This, in turn, limits the incentives for long-term investment in the workforce.

Business cycle effects on matching skills with vacancies on the labour market could be outbalanced with measures on both the macro and the micro level. On the macro level, active labour market policies, including re- and up-skilling measures, have been shown to improve skill matching efficiency. Such measures are increasingly relevant, as research suggests that "longer unemployment spells together with changing skill requirements due to technological change worsen reemployment prospects"[133,134]. On the other hand, on the micro level, companies can mediate negative effects on matching efficiency through talent management practices, such as in-house training and upskilling[135].

Structural, cyclical and firm-level factors could become barriers to skill development, both potentially resulting in and/or worsening existing skill mismatches on the macro level of the labour market and the micro level of companies and organisations.

Finally, there are several specific **barriers to the training of building workers**, which can be linked to the lack of public support to training, the limited supply as well as the uncertainty over the quality of training. The low educational attainment of a large part of the workforce may pose a challenge for participation to training, particularly regarding the implementation of new technologies, e.g. related to sustainable construction. Cultural and linguistic barriers may also pose a difficulty for attending training, in the case of

[129] The Guardian. At some point we will have no one coming into the construction industry', 2015. https://www.theguardian.com/business/2015/jun/24/construction-industry-apprenticeships-skilled-workers-training
[130] Mark Farmer, The Farmer Review of the UK Construction Labour Model, 2016.
[131] Institute of labour economics, Skill Shortages and Skill Mismatch in Europe: A Review of the Literature, 2019. http://ftp.iza.org/dp12346.pdf
[132] Ibidem
[133] Zago, R. Job Polarization, Skill Mismatch and the Great Recession. Working Paper, Sciences Po, Paris, 2017.
[134] Institute of labour economics, Skill Shortages and Skill Mismatch in Europe: A Review of the Literature, 2019. http://ftp.iza.org/dp12346.pdf
[135] Ibidem.

migrant workers. In addition, the cost of training is considered too high, making it difficult to access for several smaller players in the industry. Available public funding for training, particularly for EE, often lacks a coherent framework or national approach and consists of one-off support schemes In some countries, improving the energy performance of buildings is still regarded as a luxury rather than a necessity, with energy efficient construction techniques proving to be more expensive than traditional ones. The quality of training may also be questionable in cases, where courses do not keep up with the latest technical developments or are not sufficiently based on practice.

4.2 Negative image of the sector

The construction sector suffers from an overall poor public perception connected to low job security, tough working conditions and health and safety concerns. In part, the negative image of the industry derives from its structural characteristics, such as working hours and potentially harsh conditions, yet the sector is also plagued by negative stereotypes and on overall poor reputation depicted in popular culture. Generally, these perceptions are limited to the narrow construction sector (NACE F), with sub-sectors such as architectural services and engineering activities enjoying a higher social status and being associated with higher levels of education.

This situation is not limited to the European context but has been shown to apply globally. Studies find that the construction sector has become synonymous with low-quality work and low health and safety levels[136]. Moreover, cases of traumatic or even fatal accidents on the construction sites contribute to this image. In Finland for instance, young people may associate construction work with low-paid work, as the most common image of the construction professional encountered is that of the migrant or posted worker in the city, dressed in a working outfit[137]. Research from the United Kingdom also shows that young people are rather attracted to high profile careers, associated to having high visibility and recognition of success and talent. Data from focus groups with young people concerning how they make their choice of career shows that they perceive construction to be “dirty, male oriented, unsafe and manual”[138]. Contrary to expectations of actual construction professionals, young people do not associate the work with the result – homes, iconic buildings and structures, etc. The situation is rather similar with other broad construction related activities, as explained in detail in the section 2.1. On the other hand, with the increasing technological developments and the shift away from manual labour, there is an increasing opportunity for reducing the gender gap in construction and increasing the interest of young people in a career in the construction [139].

Often, young people are faced with making a career choice quite late in their educational curriculum. Research shows that engaging school children at the primary level with the sector could be a key opportunity for raising construction’s profile. Such initiatives would require a deeper collaboration between industry and educational institutions. Other recommendations suggest that social media influencer should promote construction as a career option and provide information on the on the variety of professions within the sector[140].

A vast number of other professions linked to construction is often overlooked including the most creative ones, such as professions connected to architecture and design of buildings. Rarely young people, and especially women, see the construction sector as a potential and attractive employer.

[136] The image of the construction industry and its employment, attractiveness, 2016. https://www.ajol.info/index.php/actas/article/viewFile/151802/141414

[137] According to an interview with the Finnish Construction Trade Union

[138] CIOB, Construction as a career choice for young people https://www.ciob.org/sites/default/files/View%20Liz's%20full%20report%20here.pdf

[139] McKinsey Global Institute, Reinventing construction: a route to higher productivity, 2017. http://www.mckinsey.com/~/media/McKinsey/Industries/Capital%20Projects%20and%20Infrastructure/Our%20Insights/Reinventing%20construction%20through%20a%20productivity%20revolution/MGI-Reinventing-Construction-Full-report.ashx

[140] CIOB, Construction as a career choice for young people, 2016. https://www.ciob.org/sites/default/files/View%20Liz's%20full%20report%20here.pdf

For instance, in the United Kingdom a government survey reveals that the appeal of a career within the construction sector scores very low among 14- to 19-year olds (only 4.2 out of 10)[141]. Even among top-talent engineers and experienced interdisciplinary managers, the construction sector has the reputation of being "dull"[142]. This is telling of the low level of information young people have in making their career choice. Even when they are enrolled in educational programmes related to construction sector professions, students might become disengaged due to the lack of a clear image of the future. Research shows that the development of a professional identity, specifically through teacher role models, plays a role in student retention in VET programmes, as it expands the trainee's or learner's view of the profession[143].

The sector is generally aware of these reputational challenges and tries to engage with the broader public and young people through a number of campaigns across the EU. Especially in the United Kingdom, these challenges are taken very seriously and have received attention at the highest policy level, as they have been recognised in the overall Construction 2025 Strategy launched by the United Kingdom government in cooperation with the industry[144]. Other MS, such as the Netherlands, are tackling the image of the sector by organising open door days for the construction sector and specifically targeting schoolchildren with appropriate activities to provide information. If it manages to recruit more young workers, the construction industry will have the needed pool of skills for its development. However, stereotypical views are difficult to change, especially given the slow pace of change that is characteristic of the sector.

4.3 Suboptimal vocational education and training's quality

VET is key for skill development in construction. First, VET is the main gateway to the construction sector and the entry to the labour market for young people. Second, VET provides aspiring construction professionals with the necessary skills and knowledge to progress in their careers. In this respect, the alignment of the VET system with the needs of the market is very important for its overall efficiency and effectiveness. While adult learning programmes are effective in upskilling and reskilling people, on-the-job training needs to target professionals adequately and meet required quality objectives.

Low-skilled workers are at the highest risk of losing their jobs due to automation but are three times less likely to participate in training at work, than professionals in non-automatable positions[145]. This shows that workers in a vulnerable position in terms of job safety receive the least support.

From a macroeconomics perspective, VET is often correlated with positive impacts on wages, employment and occupational opportunity. From the point of view of employers, VET can be beneficial in terms of productivity, innovation, employment growth and organisation culture[146]. Indeed, according to a survey launched for European Business Forum on Vocational Training, there is a consensus among respondents about the crucial role of quality VET in addressing the skill gap[147].

Apprenticeships, like VET, are lacking quality and accessibility across the EU. The EC set up the European Alliance for Apprenticeships (EAfA) initiative to strengthen the quality, supply, mobility and image of

141 The Guardian, Millennials are the key to construction's skills shortage, we need to engage them, 2016. https://www.theguardian.com/lendlease-redesigning-cities-zone/2016/jul/26/millennials-are-the-key-to-constructions-skills-shortage-we-need-to-engage-them

142 McKinsey Global Institute, Reinventing construction: a route to higher productivity, 2017. http://www.mckinsey.com/~/media/McKinsey/Industries/Capital%20Projects%20and%20Infrastructure/Our%20Insights/Reinventing%20construction%20through%20a%20productivity%20revolution/MGI-Reinventing-Construction-Full-report.ashx

143 CEDEFOP, Leaving education early, 2016. https://www.CEDEFOP.europa.eu/files/5557_en.pdf

144 HM Government, Construction 2025, 2013. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/210099/bis-13-955-construction-2025-industrial-strategy.pdf

145 PwC, The Lost Workforce: Upskilling for the Future, 2019. https://www.pwc.lu/en/upskilling/docs/pwc-wgs-report-the-lost-workforce.pdf

146 CEDEFOP, The changing nature and role of vocational education and training in Europe, 2018. https://www.CEDEFOP.europa.eu/files/5574_en.pdf

147 Preparation of the European Business Forum on Vocational Training, Survey of VET-business cooperation on skills, entrepreneurship and apprenticeships, 2014. http://ec.europa.eu/dgs/education_culture/repository/education/library/study/2014/business-forum_en.pdf

apprenticeships in Europe. In 2015, Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs (DG GROW) launched a promotion of the EAfA in the construction sector, as a first individual sector to be involved[148]. The initiative aims to promote apprenticeship schemes and to encourage the stakeholders in the construction sector to offer more and better apprenticeships, via commitments and pledges, and thus to contribute to the creation of employment for youth and to improve the image of the sector. The majority of the construction pledges comes from SMEs.

Despite the recognition that VET provides key benefits to the industry and young graduates, enrolment of young people in VET programmes across the EU has not grown significantly over the past 10 years. Over the period 2014-2017, the participation rate in VET[149] across sectors has increased from 57% to 60% in the EU. In construction sector, however, the participation in VET remains much lower than in other sectors (see more in section 2.2). CEDEFOP data shows the importance of VET as a safety net for at-risk students, offering them an alternative to the general education system and allowing them to stay in education and training. Contrary to traditional national education systems, VET is a practical pathway towards professional qualification[150].

A recent study sheds a light into the specifics of apprenticeship in construction sector[151]. The study states that apprenticeship in construction sector has several specific features, compared with other sectors[152]:

1. Availability of sectoral training funds for construction in some EU countries (Germany, the Netherlands and the United Kingdom);
2. Remuneration for apprentices tends to be regulated/fixed in France, Germany, Italy and the Netherlands;
3. Requirements for companies providing apprenticeships tend to be stricter in Belgium, France, Germany, the Netherlands and the UK;
4. Stricter sector OSH requirements in construction sector compared with other sectors;
5. A formal contract is used more often in construction apprenticeships in Belgium, France and the Netherlands;
6. Bigger share of practical training (e.g. at construction sites) compare with other industries.

The study summarises the main challenges when implementing construction sector apprenticeships:

- Attracting and motivating apprentices
- Getting employer buy-in
- Expanding vocational guidance
- Making training more flexible and innovative
- Professionalising VET teachers and in-company trainers
- Integrating a multidisciplinary and holistic approach in training
- Providing skills in energy efficient building construction
- Securing sufficient resources for apprenticeships
- Fostering the mobility of apprentices, teachers and trainers
- Ensuring occupational health and safety during and outside training
- Integrating migrants into the labour market
- Initiating structural reforms of apprenticeship systems[153].

[148] European Commission, Apprenticeships for the construction industry of tomorrow, https://ec.europa.eu/growth/sectors/construction/apprenticeships/

[149] This refers to the number of new entrants into VET as a percentage of all new entrants at upper-secondary level.

[150] CEDEFOP, Early leaving from education and training, https://www.CEDEFOP.europa.eu/en/events-and-projects/projects/early-leaving-education-and-training

[151] European Commission, Monitoring of the learning commitment in the campaign on the construction sector, 2017. https://ec.europa.eu/docsroom/documents/33562

[152] Note that the study analyses only 11 EU countries.

[153] European Commission, Monitoring of the learning commitment in the campaign on the construction sector, 2017. https://ec.europa.eu/docsroom/documents/33562

Nevertheless, many VET institutions across MS are faced with the challenge of high dropout rates. CEDEFOP analysis reveals that this issue relates to the quality dimension of VET, as well as the flexibility and inclusivity of available programmes[154]. As aforementioned, teacher role models are also a factor in the retention of students within educational programmes. This directly relates to the quality of VET, as it requires a motivating and engaging learning process, allowing for young people to perceive the training as "meaningful". This is crucial in the early stages of a programme, as the absence of role models and practical exercise increases the risk of disengagement and drop out[155].

Research further shows that a weak link between the job and the VET has a negative effect on programme completion. Moving from theory to practice by practicing directly at a workplace helps students establishing a professional identity. Having an authentic relationship with the workplace is perceived as more meaningful by students, as opposed to simulated exercises. Practical experience during VET education is hence recognised as being very effective in providing relevant skills, applying theoretical knowledge and eventually facilitating the entry of VET students in the labour market[156]. VET education can either come in the form of a **dual education system**, whereby apprenticeships are included within the framework the VET education, or through apprenticeships offered by companies independently from the educational path.

The lack of cooperation between VET institutions and the construction industry contributes to the low quality of the programmes, which in turn fail to engage young people.

Two key elements are generally associated with the quality of VET programmes, namely up-to-date curricula reflecting the industry's needs and priorities, and teachers that are knowledgeable of the latest developments in the industry[157]. Typically, high quality of VET is associated with a practical-oriented curriculum, allowing students to gather professional experience while attending training. Conversely, in MS where VET's practical orientation is neglected, participation rates tend to be lower and the educational outcomes are reduced. The curricula are often not aligned with the needs of companies in the construction sector, leading to mismatch between the skills required by construction companies and those available on the market.

In many MS, initiatives are underway to reform the VET system by making it more practical and aligned to the industry's needs (see section 5.5).

Indeed, VET curricula often do not take sufficiently account of the shift in skills needed for new methods of construction, such as for instance off-site manufacturing[158]. Some institutions may be proactive and adaptive, but many ones continue to provide outdated forms of training, especially if there is no framework for updating the VET curricula. The German model is often referred as a success story in this respect, as the curricula for VET education are updated on a regular basis in collaboration with the industry, educators, social partners and the government. In turn, this helps ensure that VET students receive the same education across the country, and that the VET programmes match the expectation of industry. The EC launched the "Blueprint for Sectoral Cooperation on Skills" to help EU MS to address skill mismatch at sectoral level in several sectors including construction. In practice, consortia of sectoral stakeholders will develop sectoral skill strategies; revise or create occupational profiles and the corresponding skill needs using EU frameworks; update curricula while promoting sectoral certification and qualifications; promote job-seeker and student mobility; and design industry-led action plans for long-term roll out of the skill strategies. In a second step, the strategies will be implemented at the national and regional levels, in cooperation with public

[154] CEDEFOP, Early leaving from education and training, https://www.CEDEFOP.europa.eu/en/events-and-projects/projects/early-leaving-education-and-training

[155] CEDEFOP, Leaving education early, 2016. https://www.CEDEFOP.europa.eu/files/5557_en.pdf

[156] European Commission, Education and training monitor, 2016. https://ec.europa.eu/education/sites/education/files/monitor2016_en.pdf

[157] European Commission. Teachers and trainers in work-based learning/apprenticeships, 2017. https://ec.europa.eu/social/BlobServlet?docId=17990

[158] House of Commons, No more lost generations: Creating construction jobs for young people, 2014. http://www.ciob.org/sites/default/files/No%20more%20lost%20generations%20report.pdf

administration and the relevant construction stakeholders– including private sector associations and civil society organisations[159].

While improvements in the quality of offered VET programmes are needed to reduce dropout rates and better respond to the needs of the labour market, it is important to note that there are other important factors influencing VET outcomes. In the case of construction related VET programmes, dropout rates depend also on the general economic state of the sector.

In periods of high growth, supply of placements for apprenticeships is correspondingly high, resulting in higher levels of completion. On the other hand, during recessions, the number of vacancies in the sector reduces, leading to increase of dropout rates.

These results are based on surveys in Germany and Denmark. In the case of carpentry apprenticeships for instance, the situation differs across countries too. The quality of VET seems to play a smaller role in Austria, where carpentry apprentices might drop out due to working conditions and health issues, highlighting the importance of OSH for the broad construction sector.

4.4 Challenges in skill recognition

Mobility of skilled construction workers (both employees and self-employed) from areas of low demand to areas of higher demand can contribute to alleviating skill shortages in the EU. However, two issues often arise. On the one hand, mobility is often restricted by the non-even requirements to the recognition of qualifications among MS. On the other hand, mobility of construction workers through the widespread practice of posting is also associated with issues, namely in terms of social dumping and unfair competition, as discussed in the section below.

In the EU recognition of qualifications can take two forms, i.e. academic and professional recognition of qualifications. Academic recognition refers to the practice whereby a Member State recognises that a specific foreign diploma is comparable to a similar diploma awarded in that Member State. There is no obligation under EU law in this regard, Member States are therefore free to decide if, and according to which rules and procedures they grant such academic recognition. The recognition of professional qualifications, however, is the formal acknowledgement of a person's professional status and right to practice a so-called regulated profession in the host country. A regulated profession is any professional activity, access to or the pursuit of which, has been restricted to those who possess a specific professional qualification.[160] To ensure the free movement of regulated professionals (e.g. architects or electricians), Member States are under the obligation to mutually recognize professional qualifications in line with the Treaty and the relevant EU Directives (e.g. Professional Qualifications Directive 2005/36/EC). The following sub-section will touch upon both types of recognition of qualifications.

Legal framework

In the EU context, the Professional Qualifications Directive (PQD) is the main instrument for the recognition of professional qualifications, while the European Qualifications Framework (EQF) and the European Credit system for Vocational Education and Training (ECVET) are the two main instruments to facilitate the academic recognition of qualifications across MS.

[159] European Commission, A Blueprint for Sectoral Cooperation on Skills (Wave II) Construction. 2018. http://ec.europa.eu/social/BlobServlet?docId=19499&langId=en

[160] See Art. 3(1)(a) of Directive 2005/36/EC : 'regulated profession': a professional activity or group of professional activities, access to which, the pursuit of which, or one of the modes of pursuit of which is subject, directly or indirectly, by virtue of legislative, regulatory or administrative provisions to the possession of specific professional qualifications; in particular, the use of a professional title limited by legislative, regulatory or administrative provisions to holders of a given professional qualification shall constitute a mode of pursuit.

The European Qualifications Framework (EQF) acts as a "translation" grid, helping bridge the gap between the various national qualification systems/frameworks and covering all levels of academic qualifications across all sub-systems of education and training (i.e. general and adult education, VET, as well as higher education). It aims to make qualifications more readable and understandable across the various systems in place in every MS. As a part of the New Skills Agenda for Europe, the Council adopted a revised EQF in May 2017. The EC is working with MS on implementing the new Council recommendations in order to ensure a better understanding of the qualifications and efficient matching between available skills and the job market[161].

Similarly, European Credit system for Vocational Education and Training (ECVET), established as one of the EU priorities for VET over 2015-2020, seeks to facilitate the validation and recognition of skills and knowledge acquired in different systems and countries, as well as to increase the compatibility between the different VET systems in Europe and the qualifications they offer. To facilitate comparability between VET systems, the EQAVET is used as a reference instrument, promoting and monitoring VET improvements across MS based on commonly agreed reference framework[162].

While these provisions serve to ensure comparability and recognition on the EU level, the EU Skills Profile Tool for Third-Country Nationals was launched in 2017 to support the identification of qualifications of asylum seekers, refugees and third-country migrants. The tool aims to support national authorities responsible for the reception and integration of refugees, as well as reception and employment assistance services, education and training advisers and more. The tool can be used for self-assessment of skills and is offered as a web-tool in all EU languages (except for Irish) and in Arabic, Farsi, Pashto, Sorani, Somali, Tigrinya and Turkish[163].

The European Skills, Competences, Qualifications and Occupations (ESCO) launched in 2017 is a multilingual classification, identifying the categories of skills, competences, qualifications and occupations relevant for the EU labour market and VET[164].

ESCO has enjoyed an uptake in both public and private organisations, covering a variety of areas such as recruiting, matching skills to jobs and training, career planning. It is also used to document the skills of third-country nationals in addition to the EU Skills Profile Tool mentioned above.

The **Professional Qualifications Directive (PQD)** makes up the main legislative framework governing the recognition of **professional qualifications**. If a Member State requires a specific professional qualification to access a profession (in the form of a degree, exam, experience…), for professionals from another Member State wanting to establish or provide services, the PQD recognition regimes will apply. Adopted in 2005, the **Professional Qualifications Directive (PQD)** (Directive 2005/36/EC) replaced 15 existing directives and both clarified as well as reformed the rules on the recognition of professional qualifications. It aimed to increase mobility of skilled people by, among others, further liberalising the provision of services and extending automatic recognition of professional qualifications. The Directive was amended in 2013 by Directive 2013/55/EU, which further modernised the recognition rules and procedures, by, for example, introducing the European Professional Card (see below). It also introduced a transparency exercise obliging each EU country to report information about the professions it regulates[165], as well as a mutual evaluation exercise (2014-2016) during which Member States compared their regulatory approaches and committed to, where necessary, simplify the national regulation of professions.

The PQD enables the free movement of professionals within the EU by setting out rules for temporary mobility; establishment in another EU MS; knowledge of languages and the use of professional titles. For

161 European Commission. European Qualifications Framework https://ec.europa.eu/social/main.jsp?catId=1223#qualifications
162 Ibidem.
163 EC, EU Skills Profile Tool for Third Country Nationals, https://ec.europa.eu/social/main.jsp?catId=1412&langId=en
164 European Commission, What is ECSO. https://ec.europa.eu/esco/portal/howtouse/21da6a9a-02d1-4533-8057-dea0a824a17a
165 This information is provided in a publicly accessible database of regulated professions: https://ec.europa.eu/growth/tools-databases/regprof/index.cfm?action=homepage

those professionals wanting to establish in another Member State, the PQD provides three systems to have their professional qualifications recognised: automatic recognition on the basis of harmonised minimum training requirements, a general system of mutual recognition and automatic recognition on the basis of professional experience:

- automatic recognition on the basis of harmonised minimum training conditions is available for seven professions, namely nurses responsible for general care, midwifes, doctors (basic medical training, general practitioners and specialists), dental practitioners (and dental specialist), pharmacists, architects and veterinary surgeons
- the general system of recognition applies to other regulated professions such as teachers, translators and real estate agents, and to professionals whose qualifications do not meet minimum harmonised training conditions
- automatic recognition on the basis of professional experience is foreseen for certain professional activities in crafts, trade and industry, such as carpenters, upholsterers, beauticians etc.[166].

The Directive applies to all construction related professions and activities for which a Member State requires the possession of a specific professional qualification[167]. Architects, for example, can benefit from automatic recognition of their qualifications if their training complies with the minimum training requirements under the PQD[168]. Other examples of construction professions that will be able to rely on the recognition regimes under the PQD if the host Member State regulates that profession are real estate agents, carpenters and upholsterers, blacksmiths, building contractors, civil engineers, building engineers, building insulators, building site coordinators/surveyors, site mechanics, crane operators, electrical engineers and technicians, floor layers, glaziers, etc. These professionals will either benefit from the general system of recognition (for example real estate agents and engineers) or from automatic recognition on the basis of professional experience (for example carpenters and upholsterers)[169].

Across MS, the regulated professions in construction sector include[170]:

- architects and architectural technologists,
- asbestos removal expert
- associate engineer
- blacksmiths,
- building contractors,
- building engineers,
- building insulators,
- building site coordinators/surveyors,
- building site mechanics,
- carpenters and upholsterers
- civil engineers,
- construction/civil engineering: building of roads, bridges, railways
- crane operators / technicians,
- electrical engineers and technicians,
- electrical equipment/appliances contractor/repairer/installer,
- electricity equipment and installation inspector

166 European Commission, Recognition of professional qualifications in practice. https://ec.europa.eu/growth/single-market/services/free-movement-professionals/qualifications-recognition_en

167 Note that also qualification requirements related to a particular "mode of pursuit" of a professional activity, for example as a self-employed person, fall within the scope of the PQD.

168 And if their obtained qualification is listed in Annex V of the PQD. Note that certain architects that do not fulfil those minimum training requirements can benefit from automatic recognition via specific acquired rights.

169 European Commission, Regulated Professions Database. http://ec.europa.eu/growth/tools-databases/regprof/index.cfm?action=professions

170 European Commission, Regulated Professions Database. http://ec.europa.eu/growth/tools-databases/regprof/index.cfm?action=professions

- electromechanical engineer
- excavator operator
- fire prevention/protection officer
- floor layers and glaziers,
- Health and Safety Officer,
- heating installation technician,
- interior designer-architect
- land appraiser / surveyor,
- landscape architect / designer,
- loader,
- locksmith,
- machinery operator,
- manufacture of plant equipment (mines, iron & steel foundries, construction industry) and mechanical handling equipment
- mason /bricklayer,
- master builder,
- mechanical engineer,
- metal caster / foundry worker,
- metal design/surface engineering,
- model builder (wooden/architectural)/ model joiner,
- planning and regional development engineer/physical planner,
- plumber,
- potter / ceramist /ceramicist,
- real estate agent /real estate agency manager/administrator/director,
- road/street works professions,
- tiler,
- tinsmith/coppersmith,
- wooden furniture maker.

In parallel, the **Services Directive** (Directive 2006/123/EC) complements the PQD by aiming to remove legal and administrative barriers to trade through simplification measures that increase transparency and facilitate the provision of and access to cross-border services in the Single Market. The services covered by the Directive include the activities of most regulated professions, such as architects, engineers, and surveyors, construction services and crafts, installation and maintenance of equipment and real estate services[171]. The application of this directive across MS is discussed in further detail in the section below on Persisting challenges.

Furthermore, the **European Professional Card (EPC)** constitutes another element in place at the EU level to facilitate the recognition of professional qualifications within the EU. Launched in January 2016, it is an electronic certificate, rather than a physical card, issued via an EU-wide online procedure, which is based on the Internal Market Information System. The EPC does not replace the 'traditional' recognition procedures foreseen by the Professional Qualifications Directive, but it is an electronic alternative to traditional procedures, which simplifies the process in several ways[172]. It can be used by professionals wishing to establish permanently or provide services temporarily in another MS. It is currently available only for five

[171] European Commission, Quick guide to the Services Directive. https://ec.europa.eu/growth/single-market/services/services-directive/in-practice/quick-guide_en

[172] For more details, see Your Europe pages at: https://europa.eu/youreurope/citizens/work/professional-qualifications/european-professional-card/index_en.htm

highly mobile professions, namely general care nurses, physiotherapists, pharmacists, mountain guides and real estate agents[173].

Persisting challenges

The existent legal framework supported the considerable progress achieved with regard to the recognition of qualifications and mobility of workers. However, MS may still require a recognition processes for accessing certain regulated professions in the construction sector (e.g. architects[174], electricians). This may reduce the mobility of workers (including self-employed) and negatively affect its impact as a potential means of tackling skill shortages.

According to the recent EC communication on identifying and addressing barriers to the Single Market[175] businesses report that procedures for the recognition of professional qualifications in regulated professions (e.g. engineers) as an obstacle to the Single Market.

Difficulties with the recognition of professional qualifications might be hampering businesses development and overall development of the Single market. 42% of respondents to the recent survey of the European chambers of commerce[176] report obstacles relating to the recognition/exercise of their professional qualifications and/or meeting other requirements to access a regulated profession. These obstacles are linked to the rules on accessing the market and on the rules on conduct when providing the service. Such rules are of specific importance for the regulated professions (e.g. architects and engineers). For regulated professions, the rules on accessing the market raise issues such as access to reserved activities (requiring specific qualifications and compliance with other conditions such as compulsory membership of a professional body) and authorisation requirements[177].

Electricians and architects are the most mobile construction-related professions in Europe[178].

This situation is worsened by the frequent lack of information on the requirements that professionals, and other service providers, have to comply with, in order to work or provide services in another MS. The lack of information is less prominent for the regulated professions, due to the well-developed EU database of regulated professions, but remains a challenge especially for non-regulated professions. The lack of information is also recognised by the EC, who launched in June 2019 an infringement package challenging the functioning of Single Points of Contacts in EU MS. The package addresses issues with the implementation of the requirements for the PSCs as laid down in the Services Directive and the Professional Qualifications Directive (Directive 2005/36/EC, as amended by Directive 2013/55/EU). It also challenges the online availability and quality of information on requirements and procedures relevant for service providers and professionals who want to make use of their Single Market rights as well as the access to and completion of procedures online through the PSCs, including for cross-border users[179].

---

173 European Commission, European Professional Card. https://europa.eu/youreurope/citizens/work/professional-qualifications/european-professional-card/index_en.htm

174 Please note that architects benefit from automatic recognition of qualification (if their obtained qualification is listed in Annex V of the PQD), facilitating their mobility in Europe.

175 European Commission, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on Identifying and addressing barriers to the Single Market. March 2020, https://ec.europa.eu/info/sites/info/files/communication-eu-single-market-barriers-march-2020_en.pdf

176 Eurochambres, 'Business survey – EU Internal Market: Barriers and Solutions', 2019

177 European Commission, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on Identifying and addressing barriers to the Single Market. March 2020, https://ec.europa.eu/info/sites/info/files/communication-eu-single-market-barriers-march-2020_en.pdf

178 European Commission, Statistics- Professionals moving abroad (establishment), https://ec.europa.eu/growth/tools-databases/regprof/index.cfm?action=stat_ranking&b_services=false

179 European Commission, June infringements package: key decisions, June 2019. https://ec.europa.eu/commission/presscorner/detail/EN/MEMO_19_2772

Temporary mobility of workers in the construction sector could help in overcoming labour shortages between one MS (or region) and another.

Indeed, within the EU, construction companies may provide services cross-border and, for that purpose, post their employees to a site in another Member State as "posted workers". However, there were several challenges associated with temporary mobility and posting of workers in the context of the internal market. An important issue in this respect was the risk of **social dumping**[180], when some companies exploited wage differences among EU MS to pay lower wages. In accordance with EU rules[181] posted workers are entitled to a set of core rights in force in the host Member State. This set of rights refers to minimum rates of pay; maximum work periods and minimum rest periods; minimum paid annual leave; conditions of hiring out workers through temporary work agencies; health, safety and hygiene at work and equal treatment between men and women[182].

The European Commission defines "posted worker" as an employee sent by his employer to carry out a service in another EU Member State on a temporary basis, in the context of a contract of services, an intra-group posting or a hiring out through a temporary agency[183].

Another issue related to the posting of workers referred to the circumvention of national rules on social security and labour protection by using fake "posting" through so-called letter box companies that were only registered in the home country but did not have any activity there. To minimise the risks of such abuse, the Council adopted measures to improve and enforce EU rules on the posting of workers[184]. In addition, the EU adopted in 2018 a directive (2018/957/EU) amending the 1996 Directive on posted workers.

Box 5: New Directive on posted workers

In particular, the new directive on the posting of workers provides the following:

- all the mandatory elements of remuneration of the host Member State, including allowances, bonuses, etc.) apply to posted workers during their posting
- for posting exceeding 12 months (or 18 months following a notification from the employer), the posted worker will be subject to nearly all aspects of the labour law of the host country
- temporary work agencies are to guarantee to posted workers the same terms and conditions which apply to temporary workers hired in the MS where the work is carried out
- cooperation on fraud and abuse in the context of posting is enhanced

The deadline for transposition of the Directive is 30 July 2020. Member States cannot apply their national measures transposing the Directive before that date.

Source: European Council, 2019[185]

[180] Although there is no definition in EU law of social dumping it generally refers to "unfair competition due to the application of different wages and social protection rules to different categories of workers" (Parliamentary questions, 27 May 2015, E-008441-15)

[181] Posting of Workers Directive (Directive 96/71/EC)

[182] European Commission, Posted Workers, https://ec.europa.eu/social/main.jsp?catId=471

[183] Ibid

[184] European Commission, Employment: Commission welcomes Council adoption of Posting of Workers Enforcement Directive, 2014. http://europa.eu/rapid/press-release_IP-14-542_en.htm

[185] Council of the European Union, Posting of workers, https://www.consilium.europa.eu/en/policies/labour-mobility/posting-workers/

5.
Policy initiatives

EU MS have developed policy instruments and initiatives to address some of the issues preventing the sustainable development of the sector. These interventions tackle notably the construction sector's skill-related issues, through general or specific (e.g. EE) training schemes. In other instances, policy initiatives aim to improve the image of the construction sector and attracting young workers, supporting the development of digital skills, incentivising apprenticeships and improving the quality of VET.

While interventions and objectives may vary, the implementation of these policies often involve a multi stakeholder approach, combining governments, construction companies and associations and in some cases the academia. This chapter will cover some of these policy's interventions.

By looking at the EU28, the following key trends can be observed:

- Policy initiatives addressing the issue of skill development are general (i.e. focusing on the construction sector as a whole). They mostly consist of construction strategies, dedicated training institutions and horizontal programmes.
- However, there are increasing trend to develop training and skill development programme focusing on specific issues. In particular, the areas of EE have gained prominence in the majority of MS, with the number of initiatives increasing in the past three years;
- EE initiatives are greatly supported by the EU co-funded BUILD UP Skills programme, which is present in all EU MS. This programme plays a key role in upgrading the skills of workers in the construction sector.
- At the same time, EU MS have increasingly focused and dedicated efforts to supporting digitalisation and digital skills in the construction sector. This is the case of both in advanced and less advanced economies;
- Although apprenticeships are recognised as an important means for young graduates to enter the labour market and develop their skills, only a limited number of MS have implemented dedicated initiatives to apprenticeships in construction;
- Most of the EU MS are reforming their VET, often with a view to update curricula and provide workers with the latest set of knowledge and skills needed; and increase collaboration with the construction sector to align education and training with labour market needs;
- Over half of EU MS have introduced initiatives aiming at improving the image of construction, which in most cases target young people, and increasingly women;
- Efforts for skill recognition have evolved in recent years, no longer revolving only around the implementation of the skill cards. The EU institutions played a leading role in this respect;

Table 3 provides an overview of policy initiatives targeting skill development in the construction sector, per thematic areas and MS. Each policy area will be presented in greater detail in the following sections, outlining some of the key initiatives that MS are taking to address the specific challenges affecting skills in the construction sector.

Table 3: Overview of policy initiatives by country

Country	Broad trainings	Energy efficiency	Digitalisation	Image of construction	Women	OSH	VET	Apprenticeship	Skill cards
Austria	*	**		*		*	*	*	
Belgium	***	*		**	*		**	*	*
Bulgaria	**	*	*	*	*		*		
Cyprus	*	**					**		
Czech Republic	**	***			*		*	*	
Germany	*	*	*				*		
Denmark	*	*	**	*		***	**		*
Estonia	**	*					*		*
Greece	*	**	*	*			**		*
Spain	*	*	*	*	*	*	*	*	
Finland	*	*	*	**	*	***		**	
France	*	*			*		***	*	
Croatia	**	**	*	*			**		
Hungary	***	**	**	*		*	*	*	*
Ireland	***	***	**		*		*	*	
Italy	**	**	*	*			*		*
Lithuania	***	*	*				***		*
Luxembourg	***	***	**	*			*	*	*
Latvia	*	**					*	*	*
Malta	*	**	*	*	*	*	*		*
Netherlands	**			*			*		
Poland	*	*	*	*	*	*	*		
Portugal	**	*			*		*		
Romania	*	*		*			**		
Sweden	**	*					*	*	
Slovenia		*	*		*	*	**		*
Slovakia	*	***						*	*
United Kingdom	***		**	**	*	***		*	*

Legend	1-3 policies	*
	3-5 policies	**
	More than 5 policies	***

Note: This overview is based on the data collected by ECSO

5.1. Broad strategies to skills and training initiatives in the construction sector

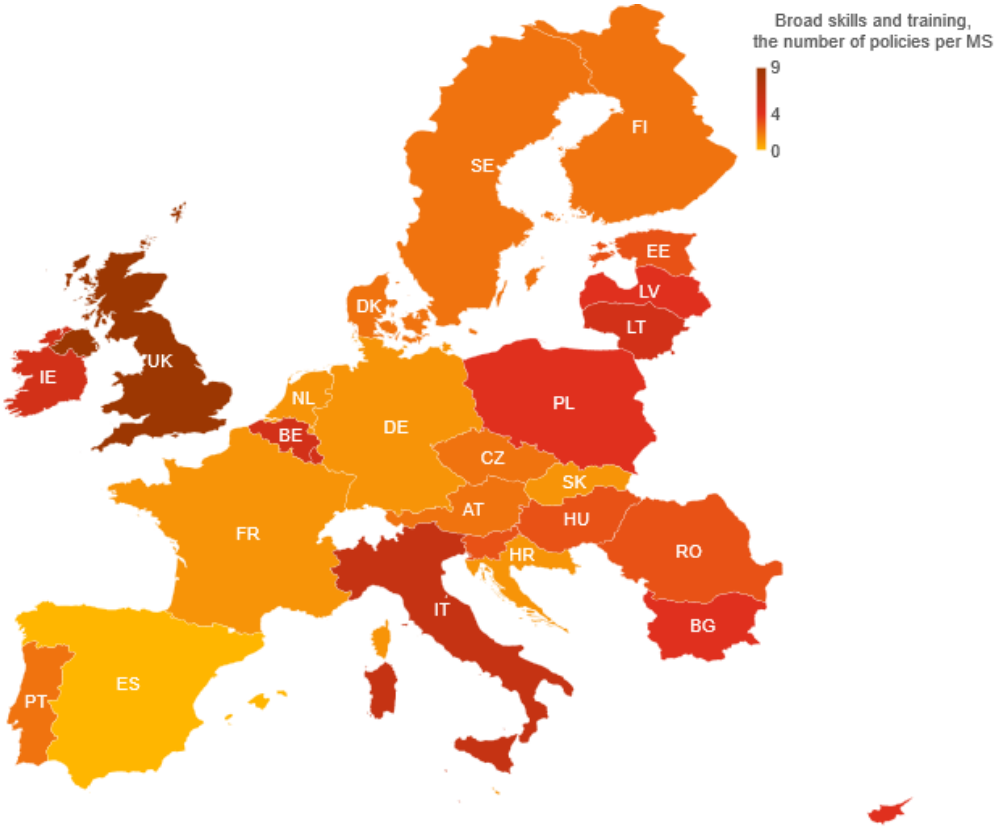
In light of the challenges faced by the construction industry, many MS implemented broad strategies and initiatives related to skills and training, i.e. applying to the whole economy including a focus on the construction sector or focusing on the construction sector as a whole.

The spectrum of initiatives and policies is very broad, ranging from longstanding institutions dedicated to vocational training in construction to horizontal programmes implemented to address a specific challenge. Broadly speaking, the following types of initiatives can be found among countries:

- General strategies for the construction sector;
- Horizontal skill-related policies and programmes.
- Creating institutions dedicated to training in construction.

The Figure below summarises the broad policies on skills and training implemented across the EU.

Figure 18: Overview of Member States with broad policies on skills and training



Note: This overview is based on data collected by ECSO

In terms of **broad strategies for the construction sector**, the Polish Integrated Skill Strategy *(Zintegrowana Strategia Umiejetnosci – ZSU)* is a prominent example. The Ministry of National Education developed a strategy, funded by the European Social Fund, on building, maintaining and using the country's human capital to significantly boost the employment and economic growth, particularly in the construction sector. The provision of trainings and the development of individual skills is seen to be amongst the main drivers for economic strength[186].

[186] See more information at: https://www.CEDEFOP.europa.eu/en/news-and-press/news/poland-developing-integrated-skills-strategy

Portugal follows a similar approach with the Sustainable Competitiveness of Construction and Real Estate Sector[187]. The strategy, which is in line with the EU Construction 2020 Strategy, is structured around seven pillars including one on promoting employment and skills in the sector. This pillar builds on the implementation of four key measures that aim at training, requalifying and enhancing the employability of construction workers. These measures aim to reorient the business fabric through vocational training and professional internships in strategic areas such as urban rehabilitation and EE. The approach followed is similar in Ireland (see Box below).

Box 6: Irish Construction 2020 Strategy

In **Ireland**, the **Construction 2020 Strategy** outlines a package of measures to boost activity in the construction sector. Improving education and skills is one of the priority actions of the strategy and focuses on identifying future skill needs, addressing skill shortages particularly in sustainable construction, reviewing apprenticeship schemes, as well as supporting the long-term unemployed[188].

Additionally, the Irish National Skills Strategy 2025 aims to make "Ireland (…) renowned at home and abroad as a place where the talent of people thrives" specifically highlighting the need for the promotion of skills in the construction sector. It states that the development of targeted skills is crucial to support the full recovery of the economy, from the low base following the recession[189]. It also highlights and takes account of the skill shortage in the construction sector. Last, it puts emphasis on the need to involve all relevant stakeholders around the table to develop efficiently workers' skills, including education and training providers, employers and workers[190].

In addition to overall strategies for the sector, several MS have also implemented **horizontal measures for the development of skills** in construction that target a broader public than specifically construction workers. Notable initiatives include those that have a specific policy focus, such as reinserting unemployed in the workforce. Notably, in Ireland, the programme MOMENTUM provided free education and training to approximately 13,000 long-term jobseekers in areas with occupational vacancies, in particular in the construction sector[191]. In the Brussels region, on the other hand, companies receive financial incentives up to EUR 50,000 for employing workers registered as jobseekers. In Italy, the National Fund for Labour Policies (*Fondo nazionale per le politiche attive del lavoro*) aims to facilitate the reintegration of the unemployed workforce. In particular, EUR 3.6 million were granted to the Emilia-Romagna region to fund its Action plan for the professional reintegration of construction workers (*Piano di intervento per il reinserimento lavorativo dei lavoratori dell'edilizia e delle costruzioni*), encompassing measures to reskill unemployed construction professionals through apprenticeships and training courses[192].

The portal Job my friend (Amico Lavoro), launched by the Italian Federation of Construction and Related Workers, provides an online service aiming to match demand and supply in the construction labour market.

It offers advice and guidance to potential candidates, helping them identify the most appropriate jobs improve their skills and knowledge through good training, create CVs and prepare for selection processes[193]. Another initiative, that target not jobseekers, but refugees is the Fit for Construction / Talents for Austria initiative (further detailed in the Box below).

187 ECSO. Policy Fact Sheet. Sustainable Competitiveness of Construction & Real Estate Sector. 2018.
188 Construction 2020 - A Strategy for a Renewed Construction Sector, 2014. http://www.merrionstreet.ie/en/wp-content/uploads/2014/05/Construction-Strategy-14-May-20141.pdf
189 See more information at: https://www.education.ie/en/Publications/Policy-Reports/pub_national_skills_strategy_2025.pdf
190 Ibidem
191 Government of Ireland. Action Plan for Jobs, 2017. https://www.djei.ie/en/Publications/Publication-files/Action-Plan-for-Jobs-2017.pdf
192 Lavori Pubblici, Corsi e incentivi in edilizia: 3,6 milioni per dare un lavoro a chi lo ha perso. June 2015. http://www.lavoripubblici.it/news/2015/06/EDILIZIA/Corsi-e-incentivi-in-edilizia-3-6-milioni-per-dare-un-lavoro-a-chi-lo-ha-perso_15364.html
193 Amico Lavoro, Chi siamo. http://www.amicolavoro.it/filca/chi-siamo/

Box 7: Fit for Construction

The Federal Economic Chamber in Austria, together with Talent Development Missethon GmbH, implemented **the Fit for Construction / Talents for Austria** initiative, and funded by the regional government of Steiermark and the construction section of the Economic Chamber in Steiermark.

This initiative, started in 2015, aimed to help unaccompanied minor refugees (UMRs) to complete an apprenticeship in the construction industry. Participating UMRs are provided with a 12-18 month training package, including basic and cultural education and job-specific coaching to enable them to succeed as an apprentice in a local construction company and successfully integrate into Austrian society.

The project successfully prepared and mediated the placement of 12 refugees in apprenticeships at local construction companies. The work enabled the government to make savings on social benefits, it enabled construction companies to fill apprenticeship vacancies and it has made a contribution to UMR integration into Austria's social and economic system. The project has received significant international attention in the media and was awarded by the UN and by EU Institutions as a best practice approach to integrating refugees into the labour market.

The broad success of the project led to the establishment of two further topic-specific training sites that are still in operation. One is focused on gastronomy and the other is focused on local and regional small and medium-sized enterprises.

Source: ECSO, 2019[194]

The initiative described in the Box above represents an example of a multi-stakeholder cooperation for the development of talent and skills for the construction sector. It is widely considered to be a good practice and a successful experience, recognised by a number of awards, including the 2018 United Nations Public Service Award, 2017 European Public Sector Award & official EU Best Practice and more. Involving different actors from the social, public and private sector and learning from previous experiences differentiates it as social innovation delivering impact.

To support these policies, dedicated training institutions play a key role in helping students and workers develop the skills needed for the professional construction workforce.

For instance, in Sweden, the Swedish Construction Industry Training Board (BYN), as a joint body representing employers and employees, focuses on advancing vocational education in construction by providing training and facilitating apprenticeships[195]. Austria has a similar institution, namely the Building Academy (*Bauakademie*), which is a leading provider of VET education with locations throughout the country, offering specialised skill training to young people and adults[196]. French construction stakeholders have joined forces to create Constructys in 2010 as the joint body (*Organisme paritaire collecteur agréé* – OPCA) for the construction sector, namely the institution that collects fees from sectoral enterprises to support training, professional development and continuous learning[197]. To support these policies, **dedicated training institutions** play a key role in helping students and workers develop the skills needed for the professional construction workforce.

194 ECSO. Policy Fact Sheet. Austria - Fit for Construction / Talents for Austria, 2019. https://ec.europa.eu/docsroom/documents/35982

195 Swedish Construction Industry Training Board (BYN). https://www.byn.se/byn/docs/Tavlingsverksamhet/the-swedish-construction-industry-training-board-and-skills-competition.pdf

196 Bauakademie. http://www.bauakademie.at/CMSArtikel.aspx?LI1=2

197 Constructys. http://www.constructys.fr/

Key takeaways

✓ **Broad strategies for the construction sector** often tackle skill shortage and skill development as a key driver for the competitiveness of the sector, providing a broad framework that can support the implementation of skill initiatives;

✓National strategies for construction are more efficient **when are linked and consistent** with the EU-wide Construction Strategy and Action Plan.

✓ There is a great variety of **horizontal measures for the development of skills**. Some of the initiatives may address specific policy objectives, such as facilitating the reinsertion in the workforce of long-term unemployed or the insertion of refugees in their host country;

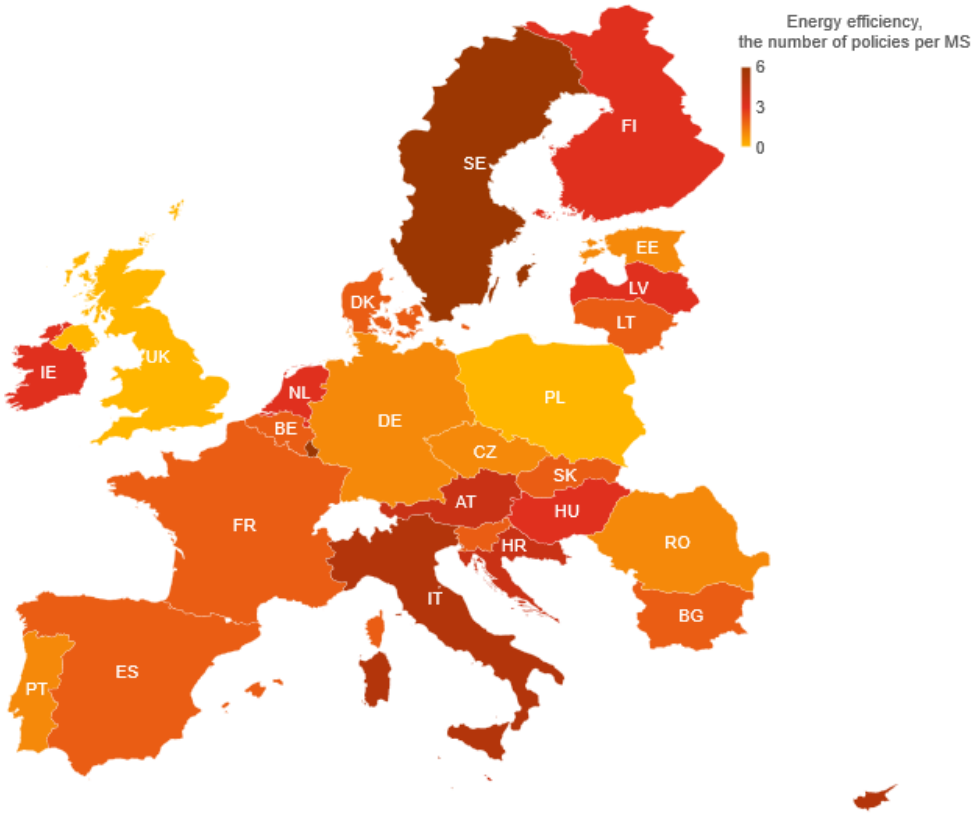
✓ **Dedicated institutions** play a key role in developing the skills needed for a professional workforce by cooperating with industry on the development and provision of training, as well as contributing to its funding.

5.2. Energy efficiency skills and training initiatives

MS are dedicating considerable efforts to develop initiatives aiming to address the training and skill needs relating to achievement of the EE targets and requirements. By further developing the EE skills of the workforce, it is also hoped that the construction sector will be able to exploit the opportunities that come with the shift towards a sustainable and energy efficient building sector.

Overall, the targeted beneficiaries of most of the initiatives aiming to impart energy-efficiency skills across the EU28 are existing construction workers.

Figure 19: Overview of member States with initiatives on strengthening skills for energy efficiency



Note: This overview is based on data collected by ECSO

Indeed, most MS are addressing the issue of strengthening the energy-efficiency skills of their workforce by developing continuous education and training programmes that build on the current expertise of onsite workers professionals to hone and improve their existing knowledge or impart new skills. This is the case across most MS, regardless of their geographical distribution.

Box 8: Cyprus: WE-Qualify initiative

The WE-Qualify: Improving Skills and Qualifications for the Building Workforce pilot initiative in Cyprus, aimed to improve the skills on EE within the construction sector by offering free trainings for participants and receipt of a certificate upon completion of the trainings[198]. The instrument was implemented in 2011-2016 on the basis of the results and lessons learned from the BUILD UP Skills CY project, seeking to pave the way for improvements of the skills within the building sector workforce and promoting the EU 2020 targets for EE buildings and certifying skills. As such, the barriers, gaps and current state of the national building sector was analysed, and a concrete national roadmap was created. The We-Qualify initiative is based on these findings and the knowledge generated from another EU MS. With the help of these two streams tailored manuals, reports and training programmes were developed for both trainers and trainees. Once the pilot project was completed, the initiative proceeded to lead other organisations with similar concepts and scope with the particular focus on photovoltaic technology instead of EE in buildings.

Source: ECSO, 2017[199].

Targeting actors present throughout the construction value chains helps raise awareness around EE, which in turn contributes to building the demand for (quality-oriented) energy efficient construction and renovation.

Indeed, such types of initiatives can be found in countries such as Sweden with the Swedish Construction Industry Training Board's Purchaser Skill scheme (*BeställarKompetens*). This scheme aims to impart methods and tools for energy efficient renovation among clients, developers and property owners. The Swedish Energy Agency's Energy Boost (*Energilyftet*) also provides training in energy efficient construction for architects, clients, construction managers and consultants.

Another type of initiatives aiming to impart energy-efficiency skills are the **"Train the Trainers"** type of scheme. These initiatives are often developed at the EU level in the framework of the EU-wide BUILD UP Skills initiative (and with EU support). For instance, in Bulgaria, the BUILD UP Skills EnerPro project resulted in the training of 319 certified workers and 114 certified trainers. Additionally, the project contributed to reducing the gap in continuing professional training of trainers in the construction sector. Similarly, in the Netherlands, BUSNL (the Dutch component of the European BUILD UP Skills programme), developed and implemented a "Train the Trainer" programme, as part of the BUS_N@W (2013-2015) project[200]. A total of 229 trainers were trained. Croatia followed a similar path though the implementation of the CROSSILLS: Energy Efficient Construction & Renovation Training programme, implemented between 2012 and 2017, which trained a total of 94 trainers[201].

Train the trainers initiatives in the EE area are mostly developed in the framework of BUILD UP Skills Initiative.

198 CEDEFOP, WE-Qualify: Improving Skills and Qualifications for the Building Workforce in Cyprus, 2016. https://www.CEDEFOP.europa.eu/en/tools/matching-skills/all-instruments/we-qualify-improving-skills-and-qualifications-building-workforce-cyprus

199 ECSO. We-qualify skills and accreditation programme, 2017. https://ec.europa.eu/docsroom/documents/30342/attachments/2/translations/

200 ECSO. BUILD UP Skills Netherlands, 2018. https://ec.europa.eu/docsroom/documents/35987

201 ECSO. CROSKILLS: Energy Efficient Construction & Renovation Training, 2019. https://ec.europa.eu/docsroom/documents/35984

As for the delivery mode of EE training initiatives, the most widespread format across MS is **classroom type of courses**, although other formats are also available. These are typically offered by national construction training providers or construction associations. Qualit'EnR in France offers short training courses for construction professionals to provide them with the necessary skills for the installation of renewable energy systems (such as photovoltaic panels, solar-powered heating systems, biomass-powered heating systems, etc.). Not least, the Danish local Vocational Education Centre South (EUC Syd) continuously aims to provide green skills in all its 75 study programmes, while simultaneously establishing a special adult education centre for construction workers that focuses on new energy-saving techniques. The institution combines traditional classroom training with learning in its test facility where participants can use real energy-saving tools and materials[202].

Increasingly, other types of initiatives are being introduced used to reach out to a wider audience and provide more flexibility for workers and employers. These encompass web-based trainings/e-learning, as well as applications (found across several MS including Denmark, Portugal, Austria, the Netherlands, Sweden and Italy).

As part of the Swedish BUILD UP Skills project SWEBUILD, the Swedish Construction Federation launched Energy Builders (*Energibyggare*)[203], a four-hour interactive web-based training in the field of energy-efficient construction and renewable energy tailored to all parties active on a construction site, including builders, installers, supervisors and managers. The programme includes areas such as thermal insulation, air-tightness, moisture control and installations. Upon successful completion of the training, the acquired qualification can be registered in the special Skill Database called ID06. Another example is the BUILDUP Skills' BUStoB project, which was implemented in the Netherlands until 2019, and which achieved to develop 76 e-learning modules and developed an application dedicated to building professionals[204].

Other means such as **seminars, summits and knowledge-sharing events** are also used to sensitise the construction stakeholders to EE related skill needs. For instance, the Future Leaders Programme in the Netherlands is organised annually by the Dutch Green Building Council to connect young ambitious professionals active in the field of sustainability of the built environment. The programme allows knowledge-sharing, coaching and networking with leaders and peers, thus shaping the next generation of sustainability leaders. As some countries also organise awareness-raising summits for stakeholders to discuss the need for energy-efficiency skills. In Italy, Formedil, the national body for professional construction training, organises the National Days of Construction Training (*Giornate nazionali della formazione edile*). The 2019 edition of the event focused on the promotion of the system of territorial Building Schools, which contributes to the education and training of entrepreneurs, workers, designers, teachers and artisans[205]. Finally, some countries are promoting the participation of the workforce in EE-related trainings through financial incentives.

Most of these training initiatives also stem from the cooperation between the public sector and national trade associations. This modus-operandi is gaining importance in the development of schemes that tackle the need for an energy-efficient skilled construction workforce.

This collaboration is seen as a key component to ensure that skill provision matches the practical needs of the industry. For example, in Latvia the BUILD UP Skills FORCE: Energy trainings for builders provided trainings for the building industry workforce (one for energy efficient engineering systems and one for energy efficient building envelopes). This occurred as a result of the Ministries of Economy and Welfare's assessment of high growth sectors, in collaboration with other sector-relevant private sector parties. While the project has ended in 2016, the trainings still continue to be offered, providing opportunities for VET

[202] See more information at: https://www.sdu.dk/en/om_sdu/institutter_centre/c_unipaedagogik
[203] Energibyggare, http://energibyggare.se/
[204] https://play.google.com/store/apps/details?id=nl.geckotech.buildupskills&hl=en
[205] See more information at: http://www.formedil.it/formedil-per-la-centralita-del-lavoro-annunciata-a-milano-una-campagna-informativa/

schemes to easily adjust and adapt to labour market demands[206]. In France, the government provides funding to construction stakeholders to develop further knowledge and trainings relating to innovation in the construction sector (see Box below).

Box 9: France's Action Programme for Construction Quality and Energy Transition

The French Ministry of Housing introduced an Action Programme for Construction Quality and Energy Transition (*Programme d'Action pour la qualité de la Construction et la Transition Energétique* - PACTE) in 2015 with a budget of EUR 30 million until 2018 supporting innovation and training among construction companies. In particular, the PACTE sought to foster the development of the EE skills of construction professionals and is structured around three main axes, namely

1) supporting the development of skills;
2) providing practical and modern tools adapted to the needs of professionals and;
3) strengthening cooperation among regions with respect to the actions and measures to build the skills of construction professionals.

The PACTE budget was available to construction stakeholders, including construction associations, which often play a key role in providing trainings to their members.

Similarly, the Brussels government introduced a Support for Vocational training to entrepreneurs (*Steun voor opleiding - Gewestelijke steunmaatregelen voor Brusselse ondernemingen*). It consists of financial support for SMEs operating in the construction sector, whereby employees are eligible for a financial refund up to 50% for the courses related to sustainable and energy saving construction. The workers that have acquired the knowledge are also encouraged to share the best practices related to sustainable living with their clients[207].

Key takeaways

✓ Most initiatives to adapt the skill base of the industry to EE requirements and sustainable construction target the **current construction workforce** (onsite workers) and **other construction actors along the value chains** (clients, developers, property owners, etc.). Examples include Luxembourg, Malta and Sweden;

✓ **Involving the actors across the value chain** in the trainings increase the awareness and raise the demand for energy-efficiency construction.

✓ **BUILD UP Skills** initiative is the biggest pan-European effort to increase the construction skills in EE. The initiative proved itself as one of few providers of **"Train the trainers"** schemes that support the capacity building on EE skills in MS.

✓ While web-based trainings are increasingly developed, **classroom-based courses** (including those using labs, simulators or models) are the most common in the EU, being organised mostly by national construction training providers or construction associations (e.g. Latvia, France), as well as originating from partnerships between public sector and industry players (e.g. France);

✓ **Other types of initiatives** (seminars, summits, knowledge-sharing events and financial incentives) are also developed to raise awareness and strengthen the EE skill base in the sector (e.g. the Netherlands, Italy and Belgium).

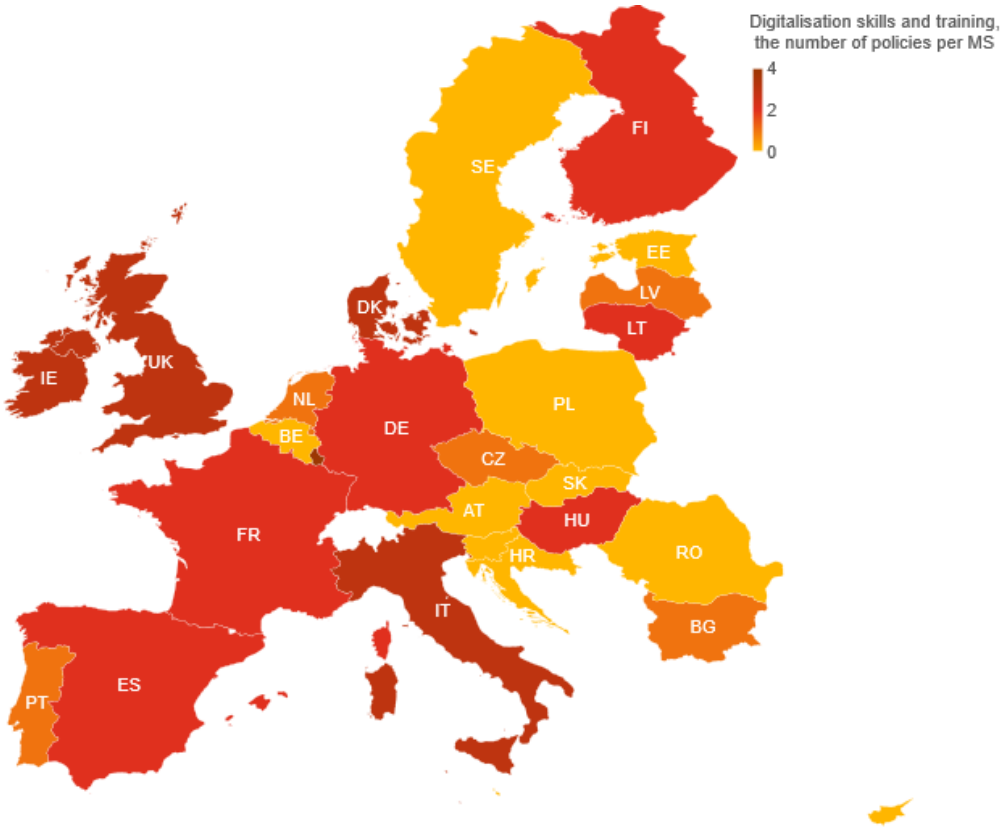
✓ At the national level, **more could be done to include the successful training schemes into the national educational and VET curriculum**, in order to make the knowledge of separate training available to a wide audience.

[206] https://www.CEDEFOP.europa.eu/en/tools/matching-skills/all-instruments/build-skills-force-energy-training-builders-latvia
[207] See more information at http://werk-economie-emploi.brussels/nl/subsidies-voor-ondernemers

5.3. Digitalisation skills and training initiatives

As discussed in the section 3.3 on Market driven innovations, digital technologies are drastically changing the way of working and therefore require the workforce to develop suitable skills to fully benefit from the opportunities opened up by the digitalisation of the construction sector. MS have hence dedicated considerable effort to develop and implement strategies and programmes that seek to integrate the use of digital tools, and particularly BIM, in the building process.

Figure 20: Overview of Member States with initiatives on digitalisation skills and training



Note: This overview is based on data collected by ECSO

Digital (BIM) skills at the EU level

Given the relatively recent start of many digital skill-related initiatives at national level, MS are currently joining efforts to better understand and define the needs for digital skills in the construction sector and subsequently develop suitable curricula. In this respect, MS are often participating in EU-wide projects, benefiting from EU financial support. Some of the most relevant projects are illustrated in the Box below.

Box 10: BIM-TRAIN – Fostering Baltic States collaboration on BIM

Transfer of BIM Training Tool for Increasing Competence of Building Sector Competence (BIM-TRAIN) is a project that encourages collaboration among MS in the development of appropriate training that responds to the increasing need for BIM skills in Europe. BIM-TRAIN specifically aims to address the lack of relevant skills, knowledge and tools related to BIM both in VET, higher education and industry, issues which are currently preventing the construction sector in the Baltic States from exploiting the opportunities opened up by BIM during the building process. It focuses on the transfer of BIM tools and methodologies to increase the understanding and skills among individuals and organisations in the construction and educational sectors.

The project is financed by the EU Leonardo da Vinci Innovation Transfer programme and led by a consortium of seven partners from Lithuania, Latvia and the Netherlands. Started in 2013 and ended in 2015 and resulted in a BIM training tool to be used both by education and training providers, as well as the private sector.

Under the Horizon 2020 Research and Innovation programme, the challenge of promoting BIM-related skills in construction has also been identified as a priority. Between July and September 2017, three EU-funded projects focusing on BIM qualification and training (BIMEET, BIMplement and Net-UBIEP[208]) started. The first, "BIM-based EU–wide Standardised Qualification Framework for achieving Energy Efficiency Training" (BIMEET), aims to foster the uptake of ICT and BIM through an upgrade of the skills of the EU construction workforce, by promoting the BIM skillset among decision makers, practitioners and blue collar workers to improve the EE of buildings, and establishing a platform for BIM for EE training[209]. Similarly, the project "Towards a learning building sector by setting up a large-scale and flexible qualification methodology integrating technical, cross-craft and BIM related skills and competences" (BIMplement) aims to train the new generation of BIM-skilled professionals and craftsmen to improve the overall quality of nZEB construction and renovation by setting up transferable training, continuing professional development and qualification schemes through a cross-crafts multidisciplinary approach[210]. Additionally, as part of the BIMplement initiative, the qualification framework was introduced consisting of descriptions and definitions of the required competences, skills and knowledge to ensure consistent learning content and quality inspections to the BIM-model, the building process and all relevant actors involved[211].

Broad strategies to BIM skills and training

Most MS introduced national strategies to foster the promotion and adoption of BIM in the construction sector. Many of these consist of action plans that entail a part of R&D, development of BIM standards and the set-up of task forces and working groups of experts and stakeholders to exchange best practices and knowledge.

While broad strategies often recognise the importance of training, they do not specifically develop and implement training initiatives. They rather help stimulate the uptake of BIM (through e.g. public procurement policies) and foster knowledge-sharing. In other words, the public sector provides a broad framework, leaving market actors and construction associations take the lead on developing and implementing dedicated training and education schemes.

The most prominent examples can be found in countries such as Denmark, Ireland and Germany, where the use of BIM can be binding and non-binding. Ireland developed a **strategy** and set up institutional bodies to monitor its implementation. The National BIM Council, a national body to support the advancement of digital in the construction sector, published its first digital strategy for Construction, the Roadmap to Digital Transition. It advocates more productive ways of working to increase competitiveness at home and overseas. Indeed, the roadmap will also support SMEs in embracing BIM and continuously innovating their building practices[212].

[208] [To be published soon on CORDIS]

[209] CORDIS, BIM-based EU -wide Standardized Qualification Framework for achieving Energy Efficiency Training. http://cordis.europa.eu/project/rcn/210091_en.html

[210] CORDIS, Towards a learning building sector by setting up a large-scale and flexible qualification methodology integrating technical, cross-craft and BIM related skills and competences. http://cordis.europa.eu/project/rcn/210066_en.html

[211] Development and Implementation of a BIM – enhanced Qualification Framework, 2019. https://www.buildup.eu/en/news/development-and-implementation-bim-enhanced-qualification-framework

[212] See more information at: https://cif.ie/2017/12/13/digital-strategy-construction-will-future-proof-industry/

In Germany, the Federal Ministry of Transport and Digital Infrastructure announced that BIM would be made **compulsory** on all transport projects by 2020, whereas the German BIM Steering Group "Planen Bauen 4.0" aims to set clear guidelines for the practical application of BIM methods by introducing the BIM Level Plan (*Stufenplan fur BIM in Deutschland*), so as to raise awareness of BIM among relevant actors and address key questions such as the roles and responsibilities of each actors (what data has to be provided by whom, what the expectations are, etc.). Indeed, as part of this initiative, the establishment of a national BIM Competence Centre is foreseen, where the findings and experiences on the use of digital planning methods will be gathered into a new central point of contact[213]. Denmark also enforced the use of BIM in public procurement since 2007[214] (more details in the Box below).

Box 11: Danish government initiative supporting BIM integration in the construction sector

As part of its public procurement law, the Danish government published the regulation 1365, adopted in 2007 (extended in 2011 with the ICT regulation 1381, and in 2013 with the ICT regulations 118 and 119). These regulations aim to foster the integration of ICT in the construction sector, thus boosting its productivity. In practice, it required the use of BIM for public sector renovation projects since the 1st of January 2008 and for state supported social housing projects since the 1st of January 2009. Since June 2011, the Danish Parliament extended the mandatory adoption of BIM to all local and regional projects worth over EUR 2.7 million, while central government projects had a lower threshold of EUR 677,000. Since April 2013, BIM has been mandatory in national, regional, municipal projects, including those on social housing. The Danish government involved the academia and the industry in the preparation of the regulations, through consultations and pilot projects. This helped ensure that BIM requirements are in line with and relevant for the industry, which can then play a key role in BIM implementation, including by helping develop tailored BIM trainings.

Source: ECSO, 2019[215].

In the Netherlands, the uptake of BIM is supported through initiatives that also aim to share information and best practices among the community. For instance, BIM Gateway (*BIM Loket*) is a national portal for **information** and management of open BIM standards in the Netherlands, thus stimulating their use. By bringing together open BIM standards into one coherent system, the BIM Locket will satisfy the need for a good information service which will answer the practical questions of users and facilitate knowledge sharing[216].

In the Netherlands, the update of BIM is supported through initiatives that aim to share information and good practices among the community.

Eastern European countries are also implementing initiatives to introduce BIM in the construction sector. In Lithuania, the Lithuanian Association of Builders, together with 12 other business and science associations, launched the Digital Construction action 2014-2020 (*Skaitmeninė Statyba*) to foster the development of BIM and introduce the National Construction Classification and Industry Foundation Classes (IFC) in the national building sector. This program promotes the development of a single infrastructure of digital construction models, and the integration into international construction networks in order to ensure that the all information and data used in construction projects throughout the life-cycle[217]. In the Czech Republic, the government introduced the BIM Implementation Strategy in 2017, expressively supporting the introduction

213 Federal Ministry of Transport and Digital Infrastructure, Masterplan Building 4.0, 2017. https://www.bmvi.de/SharedDocs/DE/Pressemitteilungen/2017/009-dobrindt-bim-gipfel.html?nn=214506

214 ECSO. Building Information Modelling in the EU construction sector, 2019. https://ec.europa.eu/docsroom/documents/34518/attachments/1/translations/en/renditions/native

215 Ibidem.

216 BIM Loket, http://www.bimloket.nl/

217 On Development of BIM Methodology and Digital Construction in Lithuania over the Period 2014-2020, 2018. https://skaitmeninestatyba.lt/wp-content/uploads/2018/01/On_development_of_BIM_and_Digital_Construction_Lithuania.pdf

of BIM method in the construction sector to promote the growth and competitiveness of the Czech economy. The strategy will be supported by the Ministry of Industry and Trade[218]. Therefore, although not strictly skilling initiatives, the schemes implemented in these countries aim to raise awareness, stimulate knowledge-sharing and boost the uptake of BIM, thus indirectly contributing to higher levels of skills and knowledge of BIM among the construction workforce.

Some MS are directly addressing the need for BIM skilling and training among the workforce, either by explicitly setting training targets in their national strategies, or by offering BIM trainings and learning resources as in the case of France and Spain.

Box 12: BIM upskilling initiatives in France

France is a leading example country of how the digital skilling of the workforce can be specifically initiated at the government level. In France, the Building Digital Transition Plan (*Plan pour la Transition Numérique dans le Bâtiment* - PTNB) was launched by the Ministry of Housing to bring about the adoption and deployment of digital technologies in the construction sector, with a particular focus on improve the digital skill-base of construction professionals. To this end, and through a total budget of EUR 20 million for 2015-2018, the PTNB coordinated several actions. These included the assessment of the offer of BIM trainings and benchmarking of international initiatives, aiming to provide construction professionals with a comprehensive picture of all training opportunities available and thus guiding them in their digital transition, as well as providing training centres with the opportunity to further align their courses with the needs of the industry. A particular focus is also put on strengthening the competences and skills of trainers and teaching staff[219].

In addition, the government has also been active in terms of promoting education, research and development around BIM. The KROQI is a collaborative platform launched in 2018 as part of the PNTB, to help build SMEs' BIM capacities. The KROQI offers free BIM mock-ups, and access to tools supporting BIM processes and collaborations such as platforms for BIM models sharing, visualisation and checking52. Another initiative (outside of the PNTB) supported by the French government is the EduBIM, a network of BIM teachers, trainers and researchers, collaborating with the industry and in charge of supporting BIM implementation through research and new learning methods. This includes several universities such as Ecole des Ponts ParisTech, École Spéciale des Travaux Publics or Ecole Supèrieure d'Architecture de Marseille[220].

In 2018, Spain introduced changes in the public procurement system allowing public administrations to demand the use of BIM methodologies, skills and trainings in the delivery of projects and work contracts.

As a result, the offer of BIM training courses increased significantly, both in universities and professional associations. Simultaneously, many BIM congresses and conferences have taken place, i.e. the European BIM Summit in Barcelona, and the EUBIM Congress in Valencia[221].

Aside from the strategic direction set out by the public sector, the practical delivery of dedicated trainings on BIM relies on the **active involvement of non-governmental institutions**, as well as cooperation with industry itself. In Ireland for instance, the Irish Green Building Council offers the BIM International training (BIM Level 2), a two-day course aiming to train building professionals in BIM by introducing best practices, standards, methods, and procedures. Comparable initiatives are found also in Eastern European countries. The Polish government also invested in BIM education, training and awareness raising. Some universities such as the

[218] BIM Implementation Strategy in the Czech Republic, 2019. https://www.mpo.cz/assets/cz/stavebnictvi-a-suroviny/bim/2019/3/Koncepce-zavadeni-metody-BIM-v-CR_EN.pdf

[219] Plan Transition Numérique dans le Bâtiment, Accompagner la montée en compétences et développer des outils adaptés. http://www.batiment-numerique.fr/notre-plan-actions/convaincre-batiment-numerique.htm

[220] ECSO. Building Information Modelling in the EU construction sector, 2019. https://ec.europa.eu/docsroom/documents/34518/attachments/1/translations/en/renditions/native

[221] The implementation of BIM in Spain: Past, Present and Future, 2018. https://www.bimcommunity.com/news/load/920/the-implementation-of-bim-in-spain-past-present-and-future

Warsaw University of Technology developed courses relating to BIM ("Implementation of BIM in Structural Design" and "BIM in Digital Construction"). The courses have become one of the most highly ranked courses[222]. The aim of the courses is to demonstrate the BIM process and how it is realised in a practical way. The Latvian Association of Civil Engineers offers a series of seminars to enhance the skills of its members regarding BIM and digital technologies

Private companies are also playing a role in training and informing construction professionals about BIM. In Bulgaria, coBuilder and Nemetschek have started educating the Bulgarian construction industry about the advantages of using BIM by organising events, such as the "Second Scientific-Applied Conference with International Participation - Project management in Construction" and "The different faces of BIM", which attracted over 150 construction and architecture professionals.

Key takeaways

✓ The update of BIM as well as other digital solution by construction companies is linked to the **market demand, competition and efficiency gains**. The skillset of construction workers related to digital tools is uneven between small and large companies.

✓ The integration of BIM in the construction sector is being supported by **national strategies**, characterised by a knowledge-sharing and best-practice exchange component. Though not specifically training initiatives, these set the general framework for the development of education and training, ultimately increasing the levels of BIM skills and knowledge among the workforce (e.g. Germany, the Netherlands, Denmark, Lithuania);

✓ In some countries, **BIM became a mandatory requirement to access public procurement opportunities**, as in the case of Germany or Denmark. This represents an effective public policy tool to incentivise construction companies to further develop the competencies of workers related to BIM;

✓ In some countries, the **digital skills of the workforce** can also be initiated explicitly at the public sector level (e.g. France and Spain), or through specific BIM trainings and learning resources offered by non-governmental institutions (e.g. Ireland, Spain, Latvia);

✓ **Some MS are also teaming up to define digital skill needs** and create appropriate training programmes and qualification frameworks by participating in EU-funded projects (e.g. BIM4VET and BIM-TRAIN, BIMplement).

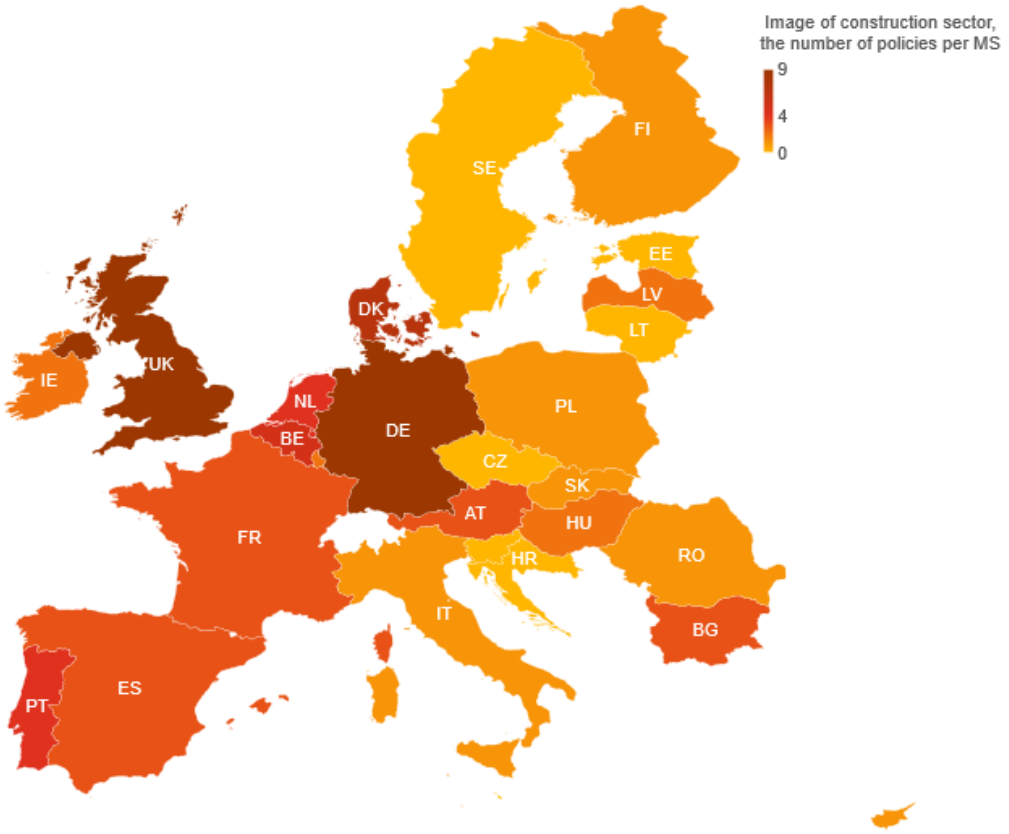
✓ **Private companies could be ambassadors of developing digitalisation training curricula**, as they are placed the best to see the market trends and needs.

[222] ECSO. Building Information Modelling in the EU construction sector, 2019 https://ec.europa.eu/docsroom/documents/34518/attachments/1/translations/en/renditions/native

5.4. Initiatives to improve the image of the construction industry

As discussed in the Chapters 3 and 4 on the drivers and obstacles to skill acquisition and development, the sector's difficulty to attract people with the right skills and/or young people could substantially compromise the sector's sustainable growth.

Figure 21: Overview of Member States with initiatives on the improvement of the sector's image



Note: This overview is based on data collected by ECSO

The sector's negative image is related with working conditions concerns, including occupational health and safety. To tackle this issue, construction sector stakeholders and policy makers have implemented various initiatives (mostly) at the national level.

These aim at raising awareness of, and strengthening, the overall image of the sector with a view to encourage young people to join the industry as their career path, as well as to facilitate a smooth career transition for older workers (towards work conditions adapted to their physical conditions).

Most policies dedicated to improving the image of the construction industry target young people, in particular **high-school students**. Typically, these initiatives aim at explaining career options in the construction sector to youngsters and making the sector more attractive as an employer. In some countries, initiatives target primary school children as well, to familiarise young students early on with what the sector represents. Popular schemes in this regard are **online portals** to improve the attractiveness of the industry, presenting VET trainings, as well as possible career paths. Notably, Denmark, Finland, Austria, Luxembourg, Belgium, the UK and Germany have introduced online portals or online-based information tools to engage with young people interested in the sector. For instance, the Chartered Institute of Building in the UK launched the online game "Craft Your Future", a construction game targeting 12-14-year-olds. The initiative aims to introduce players to career possibilities in construction. Teams of students can play together to

design, plan, collaborate and build solutions for a fictitious game city, with the game content covering maintenance, restoration, new building and refurbishment.

Box 13: BAU Dein Ding

In Germany, the campaign "Construction – your thing" (BAU Dein Ding) combines online engagement with offline contact. The online portal was launched as a regional initiative in Baden-Württemberg by the local construction industry association but has since expanded to include information from other German regions. The website offers a search function for apprenticeships and helps filter choices based on extensive lists of positions. Similar to the United Kingdom initiative, the German initiative offers a gaming experience – the BauSimulator – a construction related game, which can be played in a simulator mimicking the movements of a machine at a construction site. High scores from the game are visible on the website, where students can also watch construction related videos, presenting different professions in the field[223].

Construction Simulator Game

The initiative aimed to promote construction as a career choice to students through a variety of media channels includes the "Construction Bus" (BauBus), visiting students directly at school.

Source: BAU-Dein-Ding.de

Bus

Source: Bauwirtschaft – BW e.V.

Some portals go beyond the provision of information and provide counselling or other types of services, such as facilitating the search for apprenticeships. In most cases, these portals are **sponsored** by construction business associations, but funding may also come from chambers of commerce or social partners. In Finland for instance, the online platform MESTA.net[224] offers career and training counselling in addition to providing

[223] Bau Dein Ding, https://www.bau-dein-ding.de/bundesweit-de/action/baufilme
[224] See more information at: http://mesta.net/

information on possible careers across a broad number of professions in construction, real estate and design, as well as on all available training courses and training providers in the sector. It was launched by an association of all main construction and real estate stakeholders, including the Confederation of Finnish Construction Industries (RT), the Finnish Construction Managers and Engineers (RKL) and the Finnish Association of Architects. The Danish platform is funded by the Labour Union 3F, in addition to the Danish Construction Association. The Danish portal "Build the Future" (*Byg Fremtiden*) provides information on the 16 vocational education programmes in the Danish construction sector and includes a test that enables visitors to explore which educational programme is most suited to them[225].

Promotional campaigns are also used to engage with young people and often include a competition to discover the various construction professions and trades. MS such as Slovakia, Poland, Luxembourg, France and Latvia have launched interactive programmes where young people are invited to participate in competition, games, events and similar activities.

These projects are usually yearly events, where youngsters compete in "Building Olympics" or analogous actions. In France, the Serious Games project (*Jeux sérieux*) addresses young students and VET teachers by offering a set of interactive training challenges based on the construction of the high-speed train line Tours-Bordeaux. In Slovakia, students can get hands-on experience across various trades such as masonry, joinery, carpentry, bricklaying and floor fitting in the yearly competition of construction crafts (*Súťažná prehliadka stavebných remesiel*). In Austria, the Federal Economic Chamber WKO launched a promotional campaign on television called "Master Builder Campaign" (*Baumeisterkampagne*) designed to enhance the image of the industry with TV-spots as well as YouTube videos. In addition to national skill competitions, the EU-wide EuroSkills campaign brings together young people from across Europe to compete for the European title in vocational skills. The campaign aims at raising awareness about vocational career paths, as well as stimulating interest and promoting the quality of VET training[226]. First launched in 2016, EuroSkills 2020 will take place in Graz, Austria.

The European Vocational Skills Week is organised annually by European Commission[227]. The event aims promote excellence in VET as a tool to achieve quality career and life as any other learning pathway. The European Vocational Skills Week features the VET Excellence Awards including the European Alliance for Apprenticeships (EAfA) Award. The awards are given in four domains: Companies and learners, VET innovators, European funding for excellence and European Agencies Awards. In 2019, Chadwicks Plumb Centre from Ireland and Hot & Cold Therm Kft, a construction company from Hungary received the Training at Work Award. A carpentry and joinery apprentice from Northern Ireland and HİDROMEK, a construction machinery company from Turkey got the EAfA Award[228].

Helping experienced workers find an adequate position

To tackle labour shortages, construction stakeholders and governments across MS have launched initiatives to retain older construction professionals in the workforce, as well as to inform experienced professionals from other fields about opportunities in the sector.

In Finland, for instance, there is an official system in place for the construction sector, launched by pension funds. This scheme is designed to upskill construction workers, allowing them to continue their education with planning, drawing or leading the work at a building site. This way, older workers can upgrade to physically lighter jobs, allowing them to stay part of the workforce and at the same time tackling shortages for site supervisors and other positions, which could profit from well experienced upskilled professionals. In

[225] See more information at: https://www.bygfremtiden.dk/
[226] EuroSkills 2020 https://euroskills2020.com/wp-content/uploads/2018/09/EuroSkills-Zeitung-Nr.-4.pdf
[227] See more information at: https://ec.europa.eu/social/vocational-skills-week/
[228] European Commission, VET Excellence Awards 2019. https://ec.europa.eu/eusurvey/runner/VETExcellenceAwards2019#page0

some cases, construction workers are forced to retire earlier due to work-related health issues, which negatively impacts their pensions and exacerbates labour shortages. Providing the upskilling opportunity can boost participation in the workforce and keep people employed in better fitting positions longer[229]. Similarly, the Dutch programme "Sustainable employability" (*Duurzame inzetbaarheid bouw & infra*) is providing alternatives for older workers in the sector. The rising retirement age is a prominent subject of discussion in the construction and infrastructure sector. Many employees have a profession, requiring heavy physical work. That is why industry stakeholders from construction and infrastructure have set up Volandis, a knowledge and advice centre for employees and employers. The concept is about working safely and healthily and reaching career development goals by implementing a so called the Sustainable Employability Analysis (DIA). The analysis is focused on the health of professionals in the sector, as well as their career development

Another campaign from the Netherlands is working to attract both young people and older professionals to the construction sector. Bouwend Nederland has introduced the "inflow campaign", aimed at bringing new people in the construction sector, potentially through reskilling. The campaign has four target demographics: young people, professionals from other fields, interested in career change, unemployed people and foreign workers. The initiative runs under the slogan "You can make it in construction" (*Je gaat het maken in de bouw*), including success stories by young people, with careers in construction. The campaign is designed to improve the image of the sector and to inform people about reskilling opportunities into new careers[230].

Women in construction

While young people are generally the main target of initiatives dedicated to the attractiveness of the industry, some MS have implemented schemes that target either women in particular or are open to all actors in the construction sector. Amid the low shares of women employed in the sector, as presented in the section Workforce in construction, attracting female workers could be an important means to tackle the sector's shrinking talent pool.

Some MS have launched campaigns specifically aiming at increasing the participation of women in the construction professions. In Belgium, the online portal "Femmes de metier" is dedicated to the recruitment of women who are interested in a career in the construction sector. The portal offers information on specific trainings and includes testimonials of women working in construction.

Over 2013-2015 the EU-funded project "High Heels: Building opportunities for women in the construction sector" was carried out by a consortium of construction associations, training and consulting partners from Bulgaria, Greece, Romania and Cyprus[231]. The project trained women to strengthening their soft skills in order to improve their performance in the construction sector. The ultimate goal was to allow women to enter and advance in an industry that is traditionally male-dominated. While the project initially faced scepticism, participants' feedback has been overwhelmingly positive. Nevertheless, there has been no follow-up to this type of project by 2020[232]. Other projects such as the Womencanbuild, gather construction stakeholders from several EU countries (Spain, Germany, Portugal, France, Italy and Belgium.).

229 Interview with the Finnish Construction Trade Union, November 2019
230 ECSO. Country Fact Sheet Netherlands, 2019. https://ec.europa.eu/docsroom/documents/38326
231 High Heels- Building Opportunities for Women in Construction. http://highheelsproject.eu/index.html
232 See more information at: https://ksb.bg/wp-content/uploads/2019/03/high-heels-press-release-5-bg.pdf

Box 14: Womencanbuild

The main focus of "Womencanbuild" is to raise awareness around the potential opportunities linking women to the construction sector; and promote gender equality in construction.

In particular, the project provides e-learning classes that focused on gender sensitivity and manual for vocational training trainers in the construction sector. It trained 90 trainers for this course. Besides promoting a learning by doing type of model, (thus reconciling theory and practice), the project provides guides to be developed for VET centres for the development of mentoring skills for women. Not least a recognition system and a training platform will be established.

The project started in September 2017, and is expected to end in August 2020.

Source: Womencanbuild, 2019[233].

The Horizon 2020-funded project "Meeting of Energy professional Skills" ran over the 2015-2017 period, with the participation of 11 countries. It aimed to increase the knowledge and skills of at least 1,800 building managers (engineers, architects, etc.) in nZEB design and construction, of which 50% were planned to be women or unemployed, through a series of accredited training activities[234].

Most recently, in 2018 the initiative "Trainer for equality" was launched in a cooperation of several national organisations from Spain, Italy, Portugal, France, Germany and Belgium, co-funded by the EU Erasmus + Programme. The initiative is part of the Womencanbuild project, led by the Spanish Labour Foundation for Construction, which aims to promote equality in VET and job placements for female workers in the construction sector[235,236].

Box 15: Trainer for equality

The main focus of "Trainer for equality" is to provide trainers with gender equality competence "to enable them to promote gender equality goals in their work at all levels"[237]. The initiative identifies four target groups: trainers, women, VET centres and enterprises. Following a methodological proposal by the European Institute for Gender Equality (EIGE), the concept includes a wide range of educational and training tools, such as online modules, guidance materials, staff induction training, networks for sharing expertise, as well as face to face courses of study. The approach is based on qualitative and quantitative research, involving 453 surveys and 6 focus groups with construction trainers. Besides from being useful in defining the training curriculum, this study also explored why the presence of women is still limited in the construction sector. According to the results, the reasons for the low share of female participation in the construction workforce can be grouped in five categories:

1. Cultural Barriers and Social Prejudices, related to traditional gender roles, with construction being seen still as a "man's job".
2. Barriers related to the Work Conditions in the Sector, including the physical aspect of the work, being heavy and taking place mainly outdoors. Additionally, the study found that there is an issue

233 See more information at: http://www.womencanbuild.eu/en/the_project/
234 CORDIS, Meeting of Energy Professional Skills. http://cordis.europa.eu/project/rcn/194619_en.html
235 Re-envisioning Vocational Education and Training towards an equal construction industry, 2018. http://www.womencanbuild.eu/wp-content/uploads/2018/09/WCB_IO1_Trainer-for-equality_Report_EN.pdf
236 Women Can Build: Towards An Equal Construction Industry, http://www.reforme.org/2018/03/06/women-can-build-towards-equal-construction-industry/
237 Re-envisioning Vocational Education and Training towards an equal construction industry, http://www.womencanbuild.eu/wp-content/uploads/2018/09/WCB_IO1_Trainer-for-equality_Report_EN.pdf

with equipment and materials not being sufficiently adjusted to the female physic.
3. Lack of Communication on the Sector, related to the negative image of construction professions.
4. Barriers related to the Training Offer, referring to a lack of sufficient professional guidance and information available on training offers.
5. Barriers related to female stereotypes, such as the work being too hard for a woman.

The research also found that while the presence of women in training is still limited, it is largely perceived as positive by 71% of the trainers[238].

Occupational safety and health

Efforts to improve OSH are instrumental in strengthening the image of the construction sector. Ensuring better working conditions is possible through the institutionalisation of OSH measures as part of the construction project pipeline. This role is usually dedicated to the health and safety construction coordinator at the project sites and also considered in the project planning stage.

The acquisition of OSH skills for the construction sector is supported at both the EU and the national level through various training initiatives. The International Safety and Health Construction Coordinators (ISHCOO), established in application to the European Directive 92/57/EEC[239], is the coordinating body for national safety and health construction coordinators associations at the European level.

Since the early 1990s, the appointment of construction safety and health coordinators at the project preparation stage and the project execution stage is legally required[240]. Still, there is still a long way to go in terms of the coverage and enforcement of OHS policies and initiatives, as demonstrated by the number of European countries active in ISHCOO. While the organisation counts over 60,000 coordinators in 2019, it only represents 14 European countries, indicative of a varying awareness level across the EU. The consistency of application of already adopted legislative requirements is deemed insufficient in the ISHCOO's 2016 evaluation of the practical implementation of EU Occupational Safety and Health Directives (Directive 89/391/EEC and Directive 92/57/CEE) on construction sites[241].

While there is increasing attention on OSH at the EU level, national associations have launched their own initiatives, specific to the sector. National coordinating bodies provide training and certification services for safety and health coordinators at construction sites. For instance, in the Czech Republic, the Czech Society of Building Coordinators (*Česká společnost stavebních koordinátorů*) supports the improvement of educational and practical training activities of occupational safety workers in the construction sector. The organization manages the OSH Coordinator Test, providing certification for professional competence[242]. The German organisation TÜV, an independent provider of expert inspection services in various areas is among the largest providers of health and safety training at the national level. The Box below provides further information on TÜV initiatives in the field:

238 Ibidem.
239 Council Directive 92/57/EEC of 24 June 1992 on the implementation of minimum safety and health requirements at temporary or mobile construction sites, https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=celex%3A31992L0057
240 ISHCCOO, European Construction Industry Safety and Health Coordination, 2019. https://www.ishcco.org/wp-content/uploads/2019/11/Description-of-co-ordinator-rev-191027.pdf
241 ISHCCOO, Evaluation of the EU Occupational Safety and Health Directives, 2016. https://www.ishcco.org/wp-content/uploads/2019/09/Evaluation-of-the-EU-Occupational-Safety-and-Health-Directives_June-2016.pdf
242 *Česká společnost stavebních koordinátorů,* http://cssk.cz/zkousky.html

Box 16: Construction Site Safety Training

In Germany, the law requires for large construction sites that employ multiple contractors to be overseen by a health and safety coordinator. The qualifications for this position are also defined in the requirements, with the role of the expert on-site in essence dedicated to the prevention of accidents, injuries and resulting delays and expenses[243]. In fact, ISHCOO's EU OSH 2016 evaluation of the practical implementation of EU Occupational Safety and Health Directives (Directive 89/391/EEC and Directive 92/57/CEE) on construction sites concludes that having a dedicated position for such coordinator employ represents important economic advantages to the project[244].

Besides from compliance with the existing legislation, companies have economic incentives to involve construction site coordinators who are trained in supervising specific safety risks, as they promote cost savings due to fewer delays based on a healthy workforce and are able to detect and avert problematic situations early on.

Similar to these training offerings, the Swedish Construction Federation (*Sveriges Byggindustrier*), in cooperation with its member companies, trade unions and sister organisations launched an e-learning course "Safe construction training" with its own website. The e-course aims at raising awareness of risk management and best practices to reduce the number of accidents at construction sites. The course is available and Swedish and in English in order to be open to international workers[245].

Key takeaways

✓ **Continuous and wide-reaching awareness raining campaigns** are the basis for improvement of the image of construction sector. Such campaigns should be implemented not only for students and workers, but for general population from the kindergarten to secondary schools, as well as through general communication channels to wider audience. European, national public authorities, as well as business should be involved in the implementation of such awareness raising campaigns;

✓ Most policies dedicated to improving the image of the construction industry target **young people**, mainly through **online engagement**, and are sponsored by business associations. Online portals dedicated to raising the public profile of the construction sector and amending its image also provide career counselling for young people or facilitate the search for apprenticeships;

✓ Increasingly, campaigns also target **experienced professionals from other fields**, as well as senior construction workers for upskilling into more adequate positions close to their retirement age;

✓ **Occupational safety and health** is an important part of improving the working conditions in (and the reputation of) the sector. Trainings for the acquiring of such skills are increasingly offered by construction associations;

✓ In the current legislative period 2014-2020, some MS launched campaigns specifically aimed at increasing the **participation of women in construction professions.** The continuation of such initiatives over the next policy period 2021-2027 is to be monitored as increasing women participation in the construction sector may help mitigating the shortage of labour observed in many European countries.

[243] TüV, https://www.tuv.com/world/en/construction-site-safety-training.html

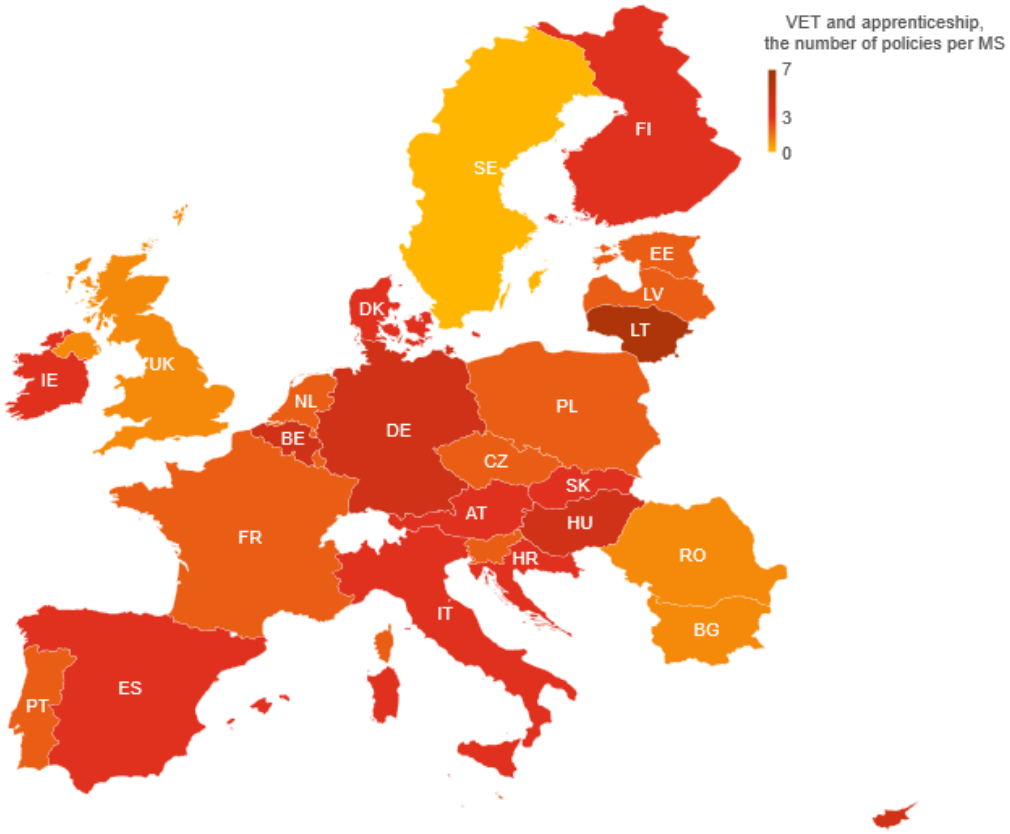
[244] ISHCCOO, Evaluation of the EU Occupational Safety and Health Directives, 2016. https://www.ishcco.org/wp-content/uploads/2019/09/Evaluation-of-the-EU-Occupational-Safety-and-Health-Directives_June-2016.pdf

[245] Sveriges Byggindustrier, E-learning course to reduce occupational accidents, https://www.sverigesbyggindustrier.se/english/e-learning-course-to-reduce-occupational__5979

5.5. Initiatives to improve vocational education and training and industry cooperation

A well-functioning VET system is essential to ensure that enough people have the right skills to enter professional trades in the construction sector.

Figure 22: Overview of Member States with initiatives on vocational education and training and apprenticeship



Note: This overview is based on data collected by ECSO

Both VET targeting young people and VET for experienced professionals play an important role in attracting and retaining workers in the field. To fulfil this premise, VET systems across the EU are undergoing a modernisation process to align it with the needs of the market and; provide students with skills that are fit to the construction sector's needs.

As discussed in the section 4.3 on Suboptimal VET's quality, curricula are often outdated and not aligned with the skill needs of the sector, as these evolve regularly over time. A lack of cooperation between the industry and educational institutions reduces the value of the vocational qualification and leads to higher dropout rates and disengagement on the side of students. Furthermore, VET schemes in some MS tend to overlook practical training, making it harder for graduates to apply their knowledge and skills. To counter these challenges, several MS are reforming their VET systems with the goal of aligning curricula to industry needs, increasing cooperation with industry actors as well as introducing dual education systems.

Improving the quality of vocational education and training

Generally, initiatives aimed at improving the quality of VET can be categorised in two main themes: the forecasting of skill needs and the updating of qualifications for VET. At the EU-level, CEDEFOP publishes regular reports on skills forecast for each MS, including trends in jobs and skills up to 2030. These reports

present an outlook on employment trends by sector, including construction, occupational groups and educational level, along with analysis of demographic projections[246]. MS have different tools in place to forecast skill needs and are therefore implementing initiatives aimed at understanding their evolution in order to align the supply of vocational education accordingly. This is the case of e.g. Portugal (see Box below).

Box 17: System of diagnosis of Qualification Needs

An instance of this is Portugal, where the System of Diagnosis of Qualification Needs (*Sistema de Antecipação de Necessidades de Qualificações*) was launched in 2015. The system makes use of quantitative and qualitative data to make predictions on the qualifications needed, allowing to prioritise VET training offer[247]. The system is regularly updated, with the latest planning for systematisation of competences launched for the school year 2019-2020, covering youth training courses and professionals' courses. This system reflects the need to effectively guarantee an increasing added value of VET, namely by anticipating demand, as well as adjusting the supply of qualifications to the needs of the economy and the labour market[248].

Reforms also touch upon defining or updating qualifications for vocational education. This is often the case for MS where the attractiveness of VET is low and there is a mismatch between labour market needs and educational supply. Furthermore, updating the qualifications framework for VET allows to ensure greater comparability with qualifications across the EU, thus facilitating the mobility of construction workers. Consequently, an important element of the EU-wide BUILD UP Skills initiative consists in setting up qualifications related to EE in buildings and including these in the respective national qualification frameworks, as it was carried out in Cyprus in the WE-Qualify project[249] or in Romania under Qualishell[250].

Box 18: VET curricula reform in Croatia

Similarly, Croatia launched its VET curricula reform in early 2019. The Agency for VET and Adult Education introduced the project on VET modernisation, funded by the European Social Fund, with the aim to significantly improve the quality and relevance of educational and training offering through an extensive system redesign. The new focus of VET curricula in Croatia will be to align labour market needs with supply by stepping up work-based learning and updating the teaching programme[251].

Furthermore, greater collaboration with industry is considered a key success factor for the development of quality VET systems. A number of MS have recognised this need and are implementing reforms to include industry stakeholders in designing vocational education. For instance, in November 2018, Poland adopted an Act, introducing changes to VET as part of an educational reform launched in 2016. The Act is designed to emphasise cooperation between educational institutions and employers, focusing on apprenticeships as an important part of VET for learners in upper secondary education and first-stage sectoral programmes[252]. Along similar lines, Ireland implemented the Springboard initiative, whereby firms from the construction

246 CEDEFOP, Skills, forecast country reports, https://www.CEDEFOP.europa.eu/en/publications-and-resources/country-reports/skills-forecasts?page=1

247 System of Diagnosis of Qualification Needs (*Sistema de Antecipação de Necessidades de Qualificações*). http://sanq.anqep.gov.pt/?page_id=23

248 Diario da republica electronico, Despacho n.º 2387-A/2019, https://dre.pt/pesquisa/-/search/120713477/details/maximized?print_preview=print-preview

249 Improve Skills and Qualifications in the Building Workforce in Cyprus (BUILD UP SKILLS WE-QUALIFY). https://ec.europa.eu/energy/intelligent/projects/en/projects/build-skills-we-qualify

250 BUILD UP Skills QualiShell, 2015. https://ec.europa.eu/energy/intelligent/projects/sites/iee-projects/files/projects/documents/build_up_skills_qualishell-2015.08.pdf

251 CEDEFOP, Croatia: VET curricula reform places VET in spotlight, 2019. https://www.CEDEFOP.europa.eu/en/news-and-press/news/croatia-vet-curricula-reform-places-vet-spotlight

252 CEDEFOP, Poland: VET reform countries, 2018. https://www.CEDEFOP.europa.eu/en/news-and-press/news/poland-vet-reform-continues

sector partner with education and training providers to offer a broad choice of courses across areas such as management and non-wet trades, ICT, BIM, "green" construction and chartered surveying[253]. Furthermore, greater collaboration with industry is considered a key success factor for the development of quality VET systems. Finally, **practical learning and apprenticeships** are considered other two key elements for the successful implementation of VET systems and preparation of VET graduates for entry into the labour force. As a result, many MS are emphasising **dual education** approaches as well as fostering the uptake of apprenticeships. For instance, in Spain, the General Council for Vocational Training was created working groups to define recommendations for updating the VET system. The Council is comprised by education and labour authorities, working alongside trade unions and employers' associations. The thematic focus of the new working groups is the improvement of the quality of the Spanish VET system through strengthening dual VET and accreditation of professional competences acquired through work experience, such as apprenticeships[254]. The Greek Ministry of Education launched a new apprenticeships programme in the 2016-2017 school year, allowing graduates from upper secondary vocational schools to obtain work experience. The number of participants in this programme has more than doubled for the 2018-2019 school year, amounting to 3,706 students[255]. Italy revisited its approach to vocational education introducing three different types of apprenticeships. First, it introduced a dual education programme consisting of either three- and four-year apprenticeships leading to a professional certificate. Second, access to professional apprenticeships aimed at young people was opened to adult workers in order to facilitate their reinsertion into the workforce. Finally, a third category of apprenticeship is open to students interesting in obtaining a higher-level qualification. In Slovakia, two VET systems - dual and non-dual, run in parallel. The optional VET system of dual education, is described in the Box below.

Box 19: System of dual education in Slovakia

In Slovakia, the Act on VET (61/2015)[256] has introduced the optional System of Dual Education in 2015. The System of Dual Education was introduced in academic year 2015/2016.

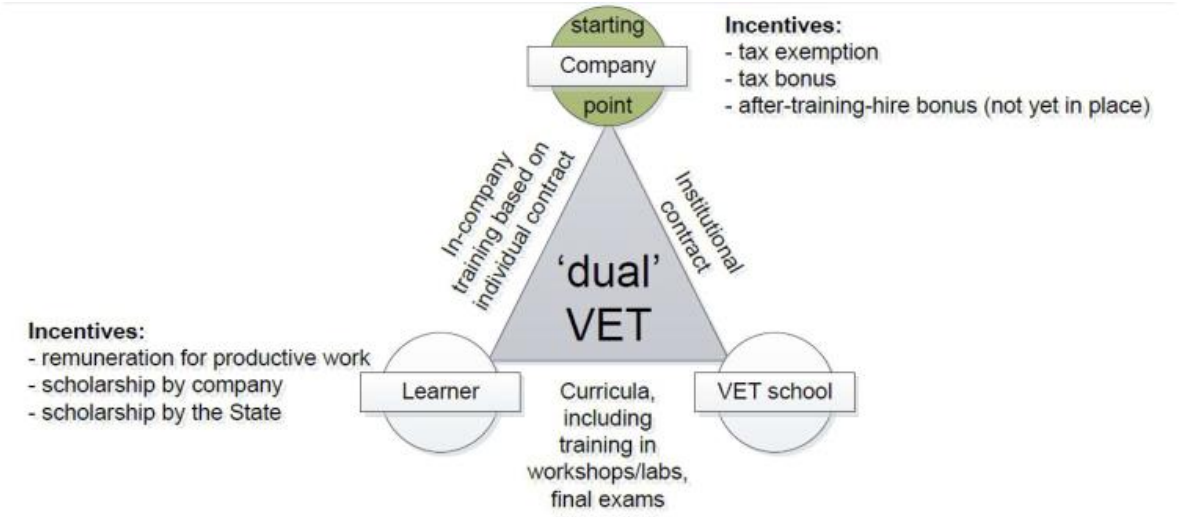
Slovak System of Dual Education is based on ISCED Level 3 VET programme that requires extensive practical education at employer's workplaces. Slovak Act on VET requires students to undertake a significant share of practical education at the employer's workplace (at least 60% of all learning hours to be undertaken at the employer's workplace).

253 Springboard initiative. http://www.springboardinitiative.com/

254 CEDEFOP, Spain : new steps to boost VET, https://www.CEDEFOP.europa.eu/en/news-and-press/news/spain-new-steps-boost-vet

255 CEDEFOP, Greece: apprenticeship reform successfully expanded, 2019. https://www.CEDEFOP.europa.eu/en/news-and-press/news/greece-apprenticeship-reform-successfully-expanded

256 Zákon o odbornom vzdelávaní a príprave a o zmene a doplnení niektorých zákonov, from 31 March 2015, http://www.zakonypreludi.sk/zz/2015-61



In contrast to traditional apprentices, learners in dual VET in Slovakia are students and not employees of a company that provides training. The Law foresees a formal contract between the student and employer. It also sets up full responsibility of employer on the organisation, quality and content of practical education and requires employers to cover the costs of practical education, including salaries of students. The Law sets us financial incentives to employers and student to engage in the VET system. Most of the financial incentives are in a form of tax reductions or exemptions calculated per student and are fixed according to the extent of provided work-based training.

Source: CEDEFOP, European Partnership for Apprenticeships

Coordinating public and private sector needs and demands

Additional to the challenges of delivering a practically oriented VET, which is also aligned with current market needs and actual workplace realities, VET also has to take into account emerging and growing trends in the sector. Market driven innovation requires professionals to attain a number of new skills related to the digitalisation, new materials and new EE standards. In order to bring about the scaling-up of innovations from the company level to the market, several initiatives have been launched.

Box 20: Building Campus

In the Netherlands, the Building Campus (*Bouwcampus*) provides a space (co-creation lab) and network that brings together a variety of stakeholders and actors in the construction sector, encouraging and facilitating open innovation to address issues in residential construction, infrastructure, commercial buildings and public spaces. The campus is set up as a public-private initiative between bodies such as Rijkswaterstaat (part of the Dutch Ministry of Infrastructure and the Environment responsible for the design, construction and management of infrastructure facilities), the Central Government Real Estate Agency (*Rijksvastgoedbedrijf*), Bouwend Nederland, municipalities, engineering firms and contractors.

In Luxembourg, the Digital Skills Bridge project was launched in May 2018, offering companies from all sectors and size technical assistance to plan and put skill management strategies in place in view of increasing automation and digitalisation of work. The project was launched by the Ministry of Labour, Employment and the Social Economy, the Ministry of Economy and the national employment services, in

cooperation with the Luxembourgish Business Committee (Comité de conjuncture). The latter constitutes a wide scale cooperation of different actors, including industrial federations and governmental bodies[257,258].

Cooperation with industry is also key for developing successful apprenticeship schemes, in which both the employer and the apprentice benefit from the training provided. Given that hiring an apprentice is generally expensive for a firm, several MS are introducing targeted measures to incentivise apprenticeships and to support them financially.

Box 21: Apprenticeships for the construction industry of tomorrow

In 2013, the EAfA was launched as a multi-stakeholder initiative to boost the quality, supply and image of apprenticeships in Europe. As a part of this initiative, the EC has launched a communication campaign targeted at the construction industry. The campaign aims to attract young people, improve the image of the sector and to encourage the construction industry to offer more and better apprenticeships.

The initiative invites contractors, construction workers' trade unions and professional organisations from the EU, European Free Trade Association (EFTA) and EU candidate countries, to pledge for participation in the initiative by filling in an application form.

Participant' pledges focus at:

- increasing the number and quality of apprenticeship places in the construction sector
- introducing elements of training in companies, construction training centres and/or schools that have not previously taken part in such schemes
- strengthening specific training in the construction sector, such as for EE, resource efficiency or digital economy
- transferring apprenticeship schemes which have proven their success in a country/region to another country/region where no such scheme is being used
- improving existing apprenticeship models, both general schemes practiced in a country/region and specific schemes in individual companies, to increase the quality, efficiency and visibility of such apprenticeship training models.

Since 2015, around 60 companies and associations pledged to the initiative. Among them are large European industry associations (FIEC, EBC, UNIEP) as well as Businesses, Education and training providers, Professional bodies and networks, Chambers of Commerce and Non-profit/ organisations from Belgium, Bulgaria, Denmark, France, Germany, Greece, Italy, Spain, United Kingdom and Switzerland.

Participation in the initiative increases the visibility of participants at the national and international level, facilitates networking, cooperation and the sharing of good practices. To further showcase the good practices among the participants, EAfA introduced a special award for fostering apprenticeship. In fact, this award was attributed to apprentices from the construction sector in 2017 and 2019 and also to several construction companies. This tends to demonstrate the interest and relevance of apprenticeship programme in the construction sector.

Source: European Commission, Apprenticeships for the construction industry of tomorrow, https://ec.europa.eu/growth/sectors/construction/apprenticeships_en

[257] CEDEFOP, Luxembourg: digital skills bridge, 2019. https://www.CEDEFOP.europa.eu/en/news-and-press/news/luxembourg-digital-skills-bridge
[258] Comité de conjoncture, https://cdc.gouvernement.lu/fr/service/organigramme.html

There are various instruments that are being used to increase the take-up of apprenticeships, which can be mandatory (e.g. tax schemes, mandatory placements) or voluntary (e.g. online portals, financial incentives, etc.). In the German system, a training levy is paid by companies in the construction sector to finance inter-company training as well as support the cost of in-company training of apprentices. Furthermore, the federal government contributes with funding to inter-company training centres. Similarly, in some cases, apprenticeship schemes are supported by industry associations either through financing or through brokerage services between employers and apprentices. For instance, in Austria, the Association of the Building Industry (*Fachverbandes der Bauindustrie*)[259] pays a bonus of EUR 1,650 per year and per apprentice to their members for employing an apprentice. Furthermore, the Irish state organisation SOLAS, in charge of managing Further Education and Training in Ireland, introduced the so-called "Shared Apprentice Scheme"[260], aimed at increasing the number and quality of new apprentices, particularly in trades such as plastering and concrete work. Furthermore, some initiatives aim at matching supply and demand of apprenticeships. Again, in Ireland, the website *apprentices.ie*[261] run by the Construction Industry Federation (CIF) brings together employers and job seekers to suitable apprenticeships across the country. Recently, in 2018, Slovenia put in place a new Apprenticeship Act, which offers slightly different incentives (see Box below).

Box 22: New Apprenticeship Act in Slovenia

Adopting a multi-stakeholder approach, the government together with private sector associations, unions and the Institute of the Republic of Slovenia for VET (CPI) developed the Act on Apprenticeship. The latter introduces two paths for three-year upper secondary VET programmes: school venue and apprenticeship. While these paths are equivalent (offering the possibility to switch from one to the other), they differ in the time spent with the employer. In the apprenticeship model, 50% of the programme is carried out by one or several employers; and 40% at school. The act envisages the shared financing of practical training for employers until 2021. The International Monetary Fund (IMF) noted that, "*if well-implemented, these reforms will also promote inclusion, as low-performing and disadvantaged students are highly concentrated in vocational programs. Moreover, they will help address the increasing skill shortages*"[262].

In Sweden, VET schools offering apprenticeships are entitled to receive financing subsidies by the government. This financial backing is redistributed by the school to cover apprenticeship coordination costs, as well as partly costs of the companies, hosting apprentices. A further incentive is offered to companies in the form of various grants. Alongside a general state grant aimed to encourage employers to take on apprentices, another grant scheme is available for supervisors, who undertake an online course by the National Agency for Education. Besides from grants for eligible companies, apprentices can also receive grant allowance of up to SEK 1,000 (EUR 95) per month to cover travel expenses and meals[263].

Some schemes mandated by the government include the compulsory employment of apprentices. An instance of this is the Flemish region in Belgium, where work placements were made compulsory for more than 140 VET courses as of 2014.

Similarly, the United Kingdom introduced the compulsory **Apprenticeship Levy** to collect money from employers to fund the apprenticeship scheme. The levy became mandatory as of 1 April 2017 and was set at 0.5% of an employer's wage bill and applies to companies with an annual pay bill of over GBP 3 million (EUR

[259] See more information at: http://wko.at/fvbi/
[260] See more information at: https://www.irishexaminer.com/breakingnews/ireland/apprentice-sharing-to-feature-in-new-scheme-899160.html
[261] See more information at: http://www.apprenticeship.ie/en/SitePages/Home.aspx
[262] IMF. 2018 Article iv consultation—press release; staff report; and statement by the executive director for republic of Slovenia, 2019.
[263] CEDEFOP, Flash Thematic Country Review on Apprenticeships, Sweden, https://www.CEDEFOP.europa.eu/files/4169_en_0.pdf

3.47 million). The overarching aim of the measure was to create 3 million apprenticeships by 2020[264]. It is estimated that the levy will affect 750 construction companies among those registered with the Construction Industry Training Board (CITB)[265]. The ambitious target, however, is unlikely to be met, with the number of apprenticeships starts in the 2017/2018 school year plunging by 25% year-on-year to 375,800. Companies have pointed out the complexity and rigidity of the scheme as an obstacle, with burdensome approval process for changes in the framework cited as an issue. Consequently, the government has introduced reforms in the requirements for companies, which entered into force in April 2019. Big employers will invest up to 25% of their levy funds to support apprentices, while the amount for small firms will be halved to 5%, with the remainder covered by the state[266].

Finally, some of the schemes have a specific focus in addition to fostering the uptake of apprenticeships. For instance, the programme "Ready for Apprenticeship" (*Startklar für Ausbildung*) introduced in the German federal state Berlin-Brandenburg aims at reducing the skill mismatch by helping unemployed youngster enter the construction workforce through 6-month training schemes that facilitate access into a construction profession.

Key takeaways

✓ **Developing a multidisciplinary and holistic approach in VET** ensuring problem-centred and project-based training curriculum may lead to more efficient an effective work in the sector.

✓ **Attracting and motivating apprentices and involving the employers** should be the priority areas of work to increase the coverage and efficiency of VET and apprenticeships in construction. This could be done by making the trainings more flexible and accessible to students and workers (e.g. web-based, application-based);

✓ There is a need to **incentivise apprenticeships** by allocating funds to apprentices. Some MS are introducing mandatory schemes for financing apprenticeships, while others are supported by industry associations.

✓ VET reform in EU focuses on two aspects: the need to **forecast skill needs** and the need to **update the definition of vocational qualifications**;

✓ **Close collaboration of VET providers with employers** is a key success factor for the development of quality VET systems, which reflect market needs and are in line with overarching trends, such as digitalisation and automation. It is crucial to ensure that **training curriculum is in line with market needs and latest trends**. The training modules should include the latest technological and material innovations, and be regularly updated to reflect market dynamics.

✓ **Practical learning and apprenticeships** are considered other two key elements for the successful implementation of VET systems and preparation of VET graduates for entry into the labour force.

✓ **Expanding VET and making it more innovative and flexible** (e.g. through online trainings, latest technologies, industry collaboration) could increase the participation in such schemes and improve the image of the sector.

✓ **Integrating jobless people, migrants, women or senior workers into VET programmes**. This could ease their integration into the construction sector, find most suitable place for work as well to ensure the compliance of their knowledge and skills to national standards.

[264] Government UK, PM unveils plans to boost apprenticeships and transform training, 2015. https://www.gov.uk/government/news/government-kick-starts-plans-to-reach-3-million-apprenticeships

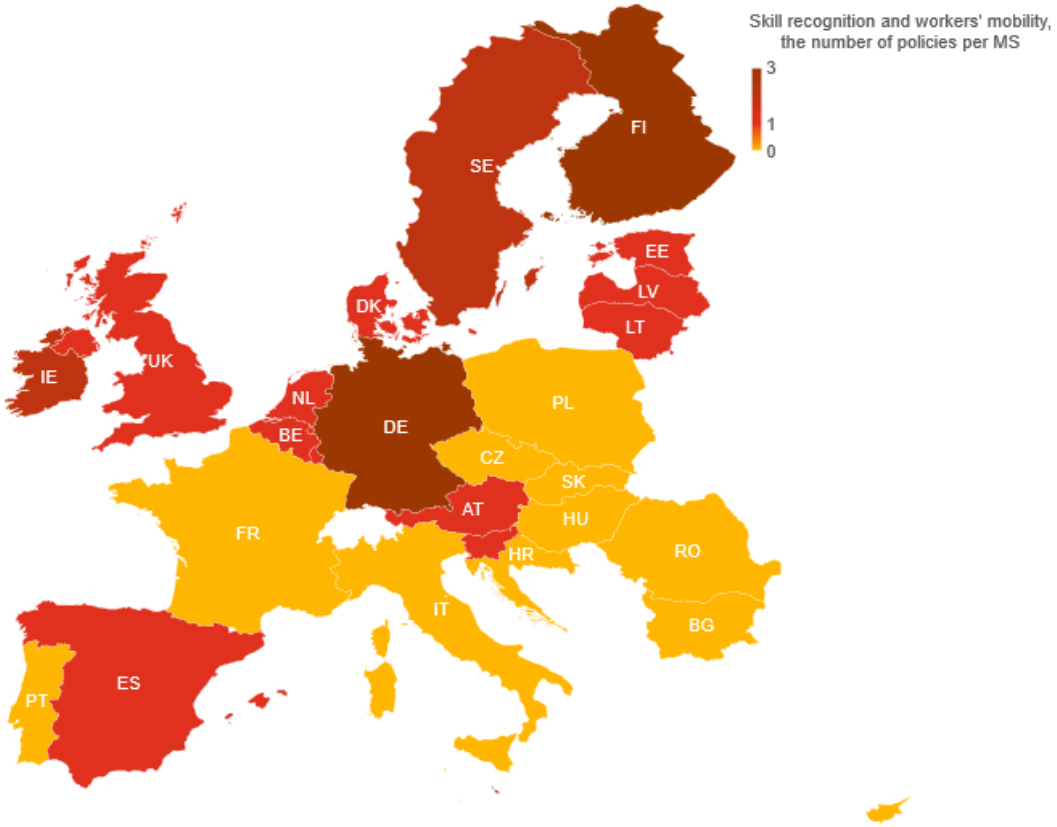
[265] CITB, Apprenticeship levy and construction. http://www.citb.co.uk/levy/apprenticeship-levy-construction/#4

[266] The Guardian, Two years in, is the apprenticeship levy still working? 2019. https://www.theguardian.com/careers/2019/mar/05/two-years-in-is-the-apprenticeship-levy-still-working

5.6. Initiatives to recognise skills and increase worker mobility

Recognising skills is an important instrument helping to tackle the issue of skill shortages by strengthening the professionalisation of the workforce as well as enhancing the mobility of construction workers. A number of MS have thus implemented policies in this area, e.g. development of the so-called skill card. However, the benefits of such policies can be ensured only when they are applied with the necessary flexibility, do not hinder employment of or service provision by other "non-recognised" construction professionals, and respect the obligations under the Professional Qualifications Directive (2005/36/EC) .

Figure 23: Overview of Member States with initiatives on skill recognition and worker mobility



Note: This overview is based on data collected by ECSO

In Malta, for instance, the Construction Industry Skill Card was implemented in 2015 and has been operational since then. The card aims to improve standards in the sector concerning quality, health and safety practices and employment conditions. It is an established method of officially recognising the experience and competence of people who have worked in the sector for years without any former qualification. In addition, workers can also benefit from training and upskilling opportunities, once their experience is formalised by the card. This in turn can facilitate job mobility and career transitions[267].

There is, however, a risk that the skill card system might become a de-facto barrier to the cross-border movement of workers (including self-employed professionals) coming from countries with no such system. Workers from those countries might face difficulties to obtain recognition of their competences and qualifications, to provide temporary and occasional construction work services or to access authorities for building permission purposes. Therefore, one should consider the potential barriers that such systems can pose to cross-border mobility.

[267] CEDEFOP, Construction Industry Skill Card, https://www.CEDEFOP.europa.eu/en/tools/matching-skills/all-instruments/construction-industry-skill-card

It should moreover be guaranteed that such a skills card cannot negatively affect the workers' rights of recognition of their professional qualifications under the system created by the Professional Qualifications Directive. For example, under the PQD, certain construction professionals might benefit from automatic recognition based on professional experience. So even if a professional has lower or no qualifications because her/his home Member State does not require these for that particular professional activity, the host Member State will still have to grant access to the profession or activity if she/he has the minimum number of years of experience (possibly combined with training) required under the Directive.

Generally, the card functions as a personal identification card, encoded in a registry of the professional qualification of each construction worker. Depending on the specific measure, the skill card may have a focus on safety at work (i.e. only workers with predetermined qualifications are allowed on certain work sites), combating undeclared employment and keeping track of professional qualifications and training. The skill card requires the registration of the employee's qualification in a centralised database. The construction worker has an electronic card with his personal data stored, which gives him or her access to the construction site. Nevertheless, the implementation of the skill card varies considerably across MS, as it can be either mandatory or voluntary, government-sponsored or led by industry or social partners, applicable to posted workers and include a data chip[268]. To date, Denmark, Finland, France, Germany, Italy, Lithuania, Luxembourg, Belgium, Malta, the Netherlands, Romania, Sweden, Spain as well as the United Kingdom have implemented such programmes.

Policies around skill recognition also cover the **improvement of the qualifications recognition process** to support employment through the validation of prior experience, formal and informal learning – as in the case of Lithuania. In Lithuania, for instance, in 2018, the Qualifications and VET Development Centre launched a four-year project, aiming to improve the quality of the national system for assessing and recognising competences and professional qualifications. The project is financed by the European Structural Investment Funds (ESIF) and is executed with the support of national expert bodies, namely the National Examination Centre and the Centre for Quality Assessment in Higher Education, along with a number of VET institutions. In some cases, initiatives are developed at the regional level, between several countries (see Box below).

Box 23: The Nordic cooperation

The formalised cooperation between the Nordic countries is one of the oldest and most extensive regional cooperatives in the world.

Regional cooperation also focuses on the topic of education and qualifications recognition. The Nordic cooperation, constituted by the three MS along with several other territories (Denmark, Finland, Sweden, Norway, Iceland, Faroe Islands, Greenland and Åland), have adopted several agreements in the area of education.

The Nordic cooperation's agreement on the general and vocational education provides students with access to the countries' (vocational) educational systems, with the same conditions applicable as for each of the states' citizens. According to the agreement, certifications and other formal qualifications evidence are mutually recognised, including partially completed education[269]. Recently, in 2018, a new service was launched allowing people with higher education from the Nordic countries to obtain a document allowing them to have their degree automatically recognised in Norway[270].

[268] FIEC, EFBWW, Social Identity Cards in the European Construction Industry, 2015. http://www.efbww.org/pdfs/EFBWWFIEC%20report%20on%20social%20ID%20cards%20in%20th e%20construction%20industry.pdf

[269] CEDEFOP, Cooperation and recognition of education among the Nordic countries, 2019. https://www.CEDEFOP.europa.eu/en/news-and-press/news/norway-cooperation-and-recognition-education-among-nordic-countries

[270] See more information at: https://www.CEDEFOP.europa.eu/da/news-and-press/news/norway-cooperation-and-recognition-education-among-nordic-countries

Another important initiative in this respect is related to the **certification of the quality of construction services** provided by construction companies. In addition to contributing to the recognition of skills and the promotion of professional development, such initiatives positively impact consumer confidence in construction services by making sure that minimum quality standards are uphold by contractors, thus minimising the risk of "cowboy builders" and contributing to improving the image of the sector. A notable initiative in this respect is Ireland's official online register of contractors, the Construction Industry Register Ireland (CIRI). All companies that want to be included in the Register are vetted to a pre-defined standard that includes making use of competent and certified professionals, implementing good governance of EE and health and safety regulations, amongst others. The scheme was launched by the government in 2014 as a way to safeguard consumers, strengthen professionalism and compliance with building regulations and standards[271].

Some MS have implemented specific policies dedicated to the mobility of workers. Depending on the MS, policies related to mobility may be intended to attract labour from other EU countries and from outside the EU or retain the domestic workforce.

Indeed, non-EU workers with professional qualifications in construction are actively recruited by the German Federal Employment Agency (*Bundesagentur für Arbeit*). The Federal Employment Agency holds a so-called White List of all professions for which the country lacks skills and aims to recruit foreign workers[272]. Action to foster intra-EU mobility is also being taken at the EU level, through initiatives such as the EU Skills Profile Tool. Furthermore, both the Services Directive and the revised Professional Qualifications Directive aim to streamline the procedures by requiring Member States to provide information about procedures online through the Points of Single Contact (PSCs) and also obliging Member States to offer electronic procedures for service providers and professionals.

Key takeaways

✓ Recognition of qualifications can take place at the **national and regional level**, where they can complement and build on each other.

✓ The **skill card** is a measure to address safety at work, undeclared employment and to keep track of professional qualifications and training. It contains information on the professional qualifications of each construction worker in the form of a personal identification card (often electronic) giving access to the construction site. However, it should be ensured that such skill card initiatives do **not hinder employment of or service provision by other "non-recognised" construction professionals, and that they respect the obligations under the Professional Qualifications Directive (2005/36/EC).**

✓ The voluntary **certification of the quality of construction services** allows to increase consumer confidence by making sure that minimum quality standards are upheld. It also contributes to the recognition of skills and the promotion of professional development;

✓ Several MS have developed **specific instruments to attract foreign labour**, such as guidelines for the management of economic migration (immigration and mobility) or a targeted list of all professions for which the country lacks skills and aims to recruit foreign workers;

[271] Construction Industry Register Ireland (CIRI). https://www.ciri.ie/about-ciri/

[272] Federal Employment Agency (Bundesagentur für Arbeit, BA), Whitelist. https://www3.arbeitsagentur.de/web/wcm/idc/groups/public/documents/webdatei/mdaw/mta4/~edisp/L6019022DSTBAI777367.pdf

6.
Lessons learnt

The European construction sector is going through major changes in terms of production processes and (sustainable) growth models. These changes are driven by both policies and market demand, following some megatrends, such as digitalisation, climate change and the circular economy. To address these challenges, but also to seize the economic and social opportunities, the construction sector needs to transform and adapt. In this context, the issue of skill development is of prime importance, as it is often mentioned as a challenge (and solution) to the sustainable development.

Several obstacles hinder employment and skill development in the construction sector. They include demographic pressures (an ageing population and an ensuing decline in the working-age group), a negative perception of the sector that limits the attractiveness of the sector towards a younger generation, as well as intrinsic factors that characterise the industry and its value chain (specifically its cyclical nature, low predictability and structural fragmentation). Combined, these obstacles have resulted in chronic underinvestment in human resources management of the sector, leading to a documented shortage of labour and especially a shortage of skills.

At the same time, the rise of sustainable construction and EE, and the progressive integration of digital technologies into the building process and built assets provide the sector with new development perspectives. It may incentivise construction stakeholders to invest in the training and upskilling of the workforce, so as to reap the benefits associated with these changes. In this respect, a balanced combination of technical and soft skills, including management, planning and communication skills, as well as ICT, digital, renewable energy and EE skills, will be crucial.

To overcome these obstacles and take full advantage of the opportunities mentioned in Chapter 3 “Drivers of skill acquisition”, policy response tends to follow three complementary pathways:

1. **Vocational Education and Training**
    - **More cooperation between the education sector and the industry**. To attract and retain talent in the sector, the education and training systems are encouraged to provide people with opportunities to learn and acquire new skills that are required in their jobs, combining theoretical and hands-on training. To do so and to improve the quality of VET in general, policies stimulate collaboration between educational institutions, sector associations and businesses in the preparation and update of curricula. Involvement of the construction industry in the preparation and the updating of curricula is supported and incentivised. Such a collaboration is seen as increasingly important, especially in the context of the rise of sustainable and energy efficient construction and digitalisation. As a result, the cooperation between educational institutions and the industry reduces skill mismatches, allowing for a better alignment between demand and supply. Taking this step will contribute to an increased share of graduation rates and a reduced share of dropout rates.
    - **Increase the availability and quality of apprenticeships**. The opportunity to be trained at work is also an important factor. Apprenticeships are key to develop skills and improve the employability of young construction professionals. The analysis presented in this report shows that MS, which developed policies dedicated to supporting apprentices and the companies offering apprenticeships, have well established systems of exchange. In this respect, some good practices highlighted in this report include additional financing of VET schools that facilitate placements of their apprentices at construction companies, as well as scholarships and additional incentives for employees who act as trainers for apprentices. Potential additional measures could include requiring apprenticeships on public sector projects, thus ensuring that the number of apprenticeships available meet demand.

Generally, more should be done to encourage employers to set up apprenticeships on private projects.

- The development of **more tangible goals** (e.g. including specific targets, deadlines, KPIs) **in national strategies and action plans for construction** could improve the consistency of VET and apprenticeship programmes with the EU Construction agenda. The bottom up approach (from business to national and EU targets) in this respect could be beneficial to facilitate the market needs and trends.
- **Focus on training the trainers**. As previously outlined, the availability of suitable trainers is one of the underlying factors affecting the quality of the training programmes and the ensuing level of skills in the workforce. Outdated qualification of the teaching staff in several MS affects VET students and explains to a certain extent the dropout rates, as shown in this report. Despite this problem, the policy response of some EU MS has been lagging, with "Train the trainers" schemes not being as widespread among national initiatives as the ones targeting construction workers. Conversely, some EU-level initiatives such as BUILD UP Skills helped tackle this issue – particularly in the fields of EE, generating encouraging results.

2. Upskilling and re-skilling of workers

- **Develop and integrate upskilling frameworks at national and sector levels**. Availability of white- and blue- collar skills timely updated to the market needs, requires a well-functioning upskilling and re-skilling model for the construction sector. These frameworks could tackle the issues of energy efficiency, they could update digital tools, they should include senior workers, women or migrants into the workforce and provide them with skill-matching jobs. Several upskilling models could be taken as a basis in this respect, such as the Digital Skills Bridge project.
- **Favour more flexible and innovative types of training**. Most training for the construction sector is often conducted in a classroom. However, many builders and related trade-workers find it difficult to combine both work and training[273]. Therefore, the EU and MS skill development initiatives increasingly use e-learning modules, and in some cases develop digital applications to help construction workers build their competencies and skills in a flexible way.
- **The new skills of construction workers, obtained through VET, apprenticeship or irregular on-the-job training should be recognised by national authorities.** Therefore, there might be a need to systematise the training and include the related skills into a centralised country catalogue of skills in order to ensure that the certification provided by the training complies with national standards.

3. Horizontal measures

- **Policy makers as well as businesses in construction sector should promote awareness raising campaigns.** When presented to a general audience, these campaigns could increase the interest in energy efficient solutions in construction and the use of digital tools, that in turn would lead to the upskilling of the workforce to keep in line with market demand. Moreover, active awareness raising campaigns on the OSH could positively affect the image of the sector and attract young people to work in construction.
- **Sustainability of training programmes** is key for their efficiency, uptake and relevance. In this respect cooperation between different construction sector players, continuous awareness raising, targeted public funding, and sustainable design are key to ensure the sustainability of training programmes.

[273] CEDEFOP. Construction workers: skills opportunities and challenges, 2016. https://skillspanorama.CEDEFOP.europa.eu/en/analytical_highlights/construction-workers-skills-opportunities-and-challenges-2016#_how_can_these_skill_needs_be_met_