



D4.1. Report on **urgent skills needs** in current occupations



Construction Blueprint 2.

Strategic Alliance for skills development under the Pact for Skills in the Construction sector

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1. Executive summary

The construction sector is under increasing pressure to respond to Europe's climate goals and digital ambitions, and this depends not only on technological innovation, but also on the ability of its workforce to quickly acquire new skills. To achieve this, it is essential to identify the gaps, shortcomings and mismatches in existing skills linked to the dual green and digital transition, as well as skills that are not considered purely technical, but those that can be applied across a range of occupations within the construction sector, particularly soft and entrepreneurial skills.

This is the context for the [Construction Blueprint 2](#) initiative, which brings together more than 20 organisations from 10 countries with the aim of **developing new strategies and partnerships** that offer specific solutions to the skills needs in the construction sector, both in terms of training in Higher Education and Vocational Training, as well as in the creation of tools for different actors in the sector to help move towards a more sustainable, digital and competitive sector. This initiative follows the path set by the [Construction Blueprint 1 project](#) (2018-2023), aimed at developing a new strategic sectoral approach to cooperate on skills in the construction sector.

In view of the above, a multidimensional analysis has been carried out, capturing both pan-European trends and country-specific realities to shed light on the most pressing skills gaps that need to be addressed in today's construction professions. Specifically, this report presents the results of a structured research and validation process carried out in ten European countries, which aimed to identify the most urgent green, digital and transversal skills gaps in the sector.

Bearing in mind the challenge of providing a common framework for 10 countries with diverse realities, a three-phase working methodology was designed and implemented to ensure systematic and comparable results.

In **Phase 1**, partners selected the most relevant occupations in need of urgent upskilling, using the ESCO classification and the European Qualifications Framework as common reference points. Out of 54 construction pre-selected occupations, 13 were deemed prioritized in at least seven countries, and from these, 10 priority occupations balanced between blue-collar and white-collar profiles were retained for detailed analysis. As part of this process, narrower occupational profile descriptions were consolidated into broader categories.

Blue-collar occupations	White-collar occupations
Carpenters and joiners	Construction managers
Insulation workers	Civil engineers
Bricklayers	Civil engineering technicians
Building electricians	Energy management officers
HVAC engineering technicians	Construction general supervisors

Priority construction occupations identified in Phase I (blue- and white-collar).

Next, in **Phase 2**, the core skills associated with these occupations were mapped using ESCO, the Centre of Vocational Excellence (CoVE) BuildSkills Academy outputs, and the BUILD UP Skills initiative. Partners assessed the urgency of each skill in their national contexts, creating a harmonised matrix of urgent digital, green and transversal skills, attending to these definitions:

- **Green skills** in construction are the knowledge and abilities required to design, build, and maintain structures with reduced environmental impact. They include competences in resource efficiency, the use of sustainable and low-carbon materials, energy-efficient design, and the integration of renewable technologies. These skills also involve aligning construction activities with the EU Taxonomy, ensuring that projects contribute to environmental objectives such as climate change mitigation, circularity, and biodiversity protection, while avoiding significant harm to other sustainability goals.
- **Digital skills** in construction refer to the capacity to use and adapt digital technologies across the building lifecycle. They range from basic digital skills, such as information and data literacy, digital communication, and the safe use of digital tools, to advanced competences including Building Information Modelling (BIM), digital twins, AI-driven planning, robotics, and the secure management of digital processes. Together, these skills enhance productivity, safety, and innovation on worksites.

- **Transversal skills** in construction are cross-cutting competences that apply across occupations and support adaptability to changing technologies and practices. They include teamwork and communication in multidisciplinary settings, problem solving and innovation, entrepreneurial and project management skills, compliance with regulatory frameworks, and awareness of health, safety, and well-being. These skills enable workers to operate effectively in dynamic environments shaped by regulatory, technological, and sustainability transitions.

Finally, in **Phase 3**, at least 3 experts per country were interviewed in order to validate the results and also to provide additional insights. Those interviews with sector stakeholders across the 10 countries captured cross-cutting skills needs, emerging trends, and recommendations on training formats and delivery.

This combination of structured frameworks and participatory validation ensured both comparability across countries and contextual relevance at national level, resulting in this report, which will itself serve as input for future project activities linked not only to the gaps and mismatches currently present (urgent skills), but also to the lack of a systemic strategy to address medium to long-term skills shortages.

Key Findings

For **blue-collar roles**, the most urgent skills are concentrated in three areas. First, **green skills** linked to energy efficiency and renewable energy integration: electricians and insulation workers must master photovoltaic panel installation, smart devices, and advanced insulation techniques, while HVAC technicians need to handle modern heat pump systems. Second, **digital skills** are increasingly embedded in daily practice, from interpreting 2D/3D plans to operating digital measurement tools, drones, and CNC machinery. Third, **transversal skills** remain essential, particularly ensuring compliance with safety standards, technical requirements, and deadlines, alongside problem-solving under time pressure. For **white-collar occupations**, urgent skills are more diverse but broadly reflect two priorities. **Green competences** are critical in planning and design—such as sustainable building systems, life cycle assessment and circular economy integration. Meanwhile, **transversal skills** dominate the profiles of construction managers, engineers, and supervisors: effective communication with crews, site coordination, project monitoring, contract management, and rapid decision-making in time-sensitive contexts. These technical and transversal skills are often supported by, though not entirely dependent on, digital tools.

Skill	Category
Advise on and determine appropriate heating and cooling systems	Green
Advise on environmental protection – communicate on environmental impact of mining, advise on building materials, pollution prevention, soil and water protection, environmental remediation, mining environmental issues, waste management	Green
Apply insulation strips, which prevent air exchange between outdoors and indoors areas using insulating false ceilings and cladding.	Green
Assess and analyse energy consumption and needs	Green/Digital
Assess resource life cycles and apply circular economy principles	Green
Building and Material Advising – advise on building matters, advise on construction materials, inspect construction supplies, calculate needs for construction supplies	Transversal
Carry out and manage energy strategies for facilities	Green
Communicate with construction crews	Transversal
Conduct energy audits and prepare performance contracts	Green/Digital
Conduct site inspections and audits – conduct engineering site audits, inspect facility sites, inspect industrial equipment	Transversal
Construction Planning and Scheduling – estimate duration of work, manage schedule of tasks, keep records of work progress, control of expenses, manage budgets	Transversal

Skill	Category
Construction Site Management – oversee construction project, manage engineering project, set up temporary construction site infrastructure	Transversal
Coordinate and inspect waste management procedures	Green
Coordinate construction activities	Transversal
Create solutions to problems	Transversal
Design sustainable building systems – design passive energy measures, insulation concepts, building envelope systems, air tightness, and window/glazing systems	Green/Digital
Ensure compliance with environmental and safety legislation	Green
Ensure compliance with environmental legislation, including Restriction of Hazardous Substances (RoHS)/ Waste Electrical and Electronic Equipment (WEEE) regulations	Green
Ensure compliance with legal requirements	Transversal
Ensure compliance, particularly with construction project deadline	Transversal
Ensure overall compliance with construction project requirements, including deadlines, safety regulations, and technical parameters.	Transversal
Install insulation and/or protection from the outside (SATE) using insulating panels	Green
Install smart devices	Green/Digital
Installation of heating/cooling systems with air-to-air heat pumps through ducts	Green
Insulation and/or protection from the inside by means of insufflation, injection, spraying or blowing.	Green
Interpretation of 2D and 3D map	Transversal/Digital
Manage contracts	Transversal
Monitor activities and perform tasks ensuring compliance with standards involving environmental protection and sustainability and amend activities in the case of changes in environmental legislation. Ensure that the processes are compliant with environment regulations and best practices.	Green
Monitor parameters' compliance in construction projects	Transversal
Mount photovoltaic panels	Green/Digital
Oversee construction project	Transversal
Perform a test run and adjust voltage	Green/Digital
Perform and manage engineering projects	Transversal
Prevent damage to utility infrastructure	Transversal
Promote sustainability, environmental awareness, and use of green materials	Green
React to events in time-critical environments	Transversal
Sort waste and demolition materials	Green

Most urgent skills identified by category



Experts further highlighted a set of **additional urgent skills**. These include competence in installing and documenting bio-based and circular materials, BIM-enabled project coordination, digital-supported logistics, ESG procurement literacy, and carbon documentation.

Looking ahead, **emerging skills**¹ point to an even deeper transformation of the sector. These include AI applications in planning and predictive maintenance, modular and prefabricated methods, smart commissioning of renewable systems, use of advanced materials such as hempcrete or low-carbon composites, integration of digital twins and IoT solutions, robotics, and comprehensive ESG reporting aligned with EU taxonomy. These will be addressed in a more comprehensive way at a later stage of the Construction Blueprint 2 project.

Training Implications

Persistent labour shortages, combined with the sector's limited appeal to younger generations, make it particularly difficult for companies, especially SMEs, to enable staff to attend training. This highlights the need for training approaches that are flexible, modular, and closely tied to the workplace. Experts converge on common recommendations: hybrid formats combining online theory and on-site practice, microlearning and frequent refreshers, innovative methods such as: Augmented Reality (AR), Augmented Virtuality (AV),

Extended Reality (XR), Mixed Reality (MR), Virtual Reality (VR) and gamification, and stronger recognition of prior learning. On-the-job learning, apprenticeships, and peer mentoring are seen as crucial to ensure immediate applicability. Many also stress the value of structured Continuing Vocational Education and Training (cVET) frameworks, ideally co-financed through sectoral or paritarian social funds to ensure broad access and fair competition.

Conclusion

The construction sector's capacity to meet Europe's climate targets and digital ambitions depends not only on technological innovation, but also on the ability of its workforce to rapidly acquire new competences. This report identifies a clear set of urgent skills needs and training responses that are both comparable across Europe and tailored to national contexts. These findings provide a robust foundation for designing targeted upskilling initiatives that can strengthen the resilience, sustainability, and competitiveness of the European construction sector.

In short, the construction sector's ability to meet EU climate goals and digital ambitions hinges not only on technical innovation, but also on a systemic shift in training provision—towards approaches that are agile, inclusive, and firmly embedded in everyday professional practice.

¹ Emerging skills are skills currently not required by the labour market, but are expected to be in the medium and long term, including for instance requirements derived by the recent EPBD approval

2. Introduction

The European Union is facing major challenges in the 21st century, including climate change, digital transformation, and the need to strengthen economic competitiveness. In response, the EU has adopted an ambitious strategy to adapt its economy and society to these global shifts.

The main goal of the twin transition in the European Union is to simultaneously advance the green and digital transformations of the economy. By promoting sustainability and climate neutrality, while also fostering innovation through digital technologies, the EU seeks to build a more resilient, competitive, and inclusive society. This approach aims to reduce environmental impact, improve efficiency, and create new opportunities for businesses and citizens. Ultimately, the twin transition is about ensuring long-term growth that is both environmentally sustainable and technologically driven.

In the construction sector, the twin transition plays a crucial role in driving sustainable growth and innovation. The green transition promotes the use of eco-friendly materials, energy-efficient buildings, and circular economy practices to reduce the sector's environmental footprint. The European Commission has agreed to decarbonise the European building stock by 2050, which will require 3 to 4 million workers to be trained in this field², increasing both the number of craftsmen and on-site workers. This is closely related also to the transition to a more sustainable circular economy in the European Union, for which trained workforce will also be required in topic as construction and demolition waste recycling plants, in building design, in the characteristics and behaviour of recycled and bio-based materials or in demolition practices

At the same time, the digital transition introduces tools, smart sensors, and data-driven management systems that improve efficiency, safety, and cost control. By combining both dimensions, the EU aims to transform construction into a more sustainable, technologically advanced, and competitive industry that supports climate neutrality goals. The digitalization of the industry is seen as essential to boost competitiveness, sustainability and productivity in the industry. The EU drives this transition through programmes such as [Digital Europe Programme](#), [Horizon Europe](#) and the [Pact for Skills](#).



For this twin transition to be successful, the process must also be accompanied by transversal and social skills. Thus, the EU promotes leadership, creativity, project management and customer orientation through [EntreComp](#) and [LifeComp](#). These skills strengthen competitiveness, sustainability and resilience in the face of current challenges.

To address the needs of the sector, and aligned with the European policies mentioned above, in 2018 the project [Construction Blueprint 1](#) was launched, funded by the Erasmus+ programme, for the implementation of a new strategic approach to sectoral cooperation on skills. This initiative was coordinated by FLC, and implemented by three European sectoral organisations, together with nine national sectoral representatives and twelve vocational education and training (VET) and higher education providers from twelve European Union countries.

Its main objective was to develop a new sectoral strategic approach to cooperation on skills in the construction industry and to support a better match between the skills needs of companies and the skills offered by training centres. During the development of the first Construction Blueprint project, it was highlighted the urgent need for developing and updating existing education and training programmes for the construction workforce to cope with the new and emerging skills needed to meet the challenges in EU in the 21st century. This need has found its point of reference in the principles and actions included in the [Pact for Skills in Construction](#), a commitment agreed by signatory entities.

Thus, based on the lessons learned from the first Construction Blueprint 1, in January 2025 we began the second phase of the project: Construction Blueprint 2. The overall objective of Construction Blueprint 2 is to create a new strategic approach and cooperation scheme involving key actors implicated in the construction sector, with the aim of developing concrete solutions for skills development that contribute to the implementation of the Pact for Skills, one of the main initiatives of the [European Skills Agenda](#), calling for sustainable competitiveness, social equity and resilience. In a rapidly changing industry, Construction Blueprint 2 works to:

- Accelerate **digital innovation** in construction
- Support the shift to a **circular and greener economy** with new training programmes
- Promote the adoption of **new technologies** across the sector

The project will develop practical tools and strategies to anticipate emerging skills, update training curricula and better connect education with real business needs in a holistic way, from Vocational Education and Training to Higher Education. It will also contribute to the Pact for Skills, supporting a skilled, competitive and sustainable European construction sector.

Main areas of interest of Construction Blueprint 2:

- Energy efficiency & renewable energy
- Digitalization & industrialization
- Green & sustainable construction
- Transversal skills
- Promotion of the attractiveness of the Construction Industry

As in the previous project, the coordinating entity for the project is the FLC. In addition, 20 entities from 10 countries are involved in its implementation, as well as three umbrella organisations, resulting in a multidisciplinary and diverse consortium.

PARTNERSHIP



[Fundación Laboral de la Construcción – FLC \(Coordinator, Spain\)](#)



[Confederación Nacional de la Construcción – CNC \(Spain\)](#)



[Comisiones Obreras del Hábitat – CCOO Hábitat \(Spain\)](#)



[Federación de Industria, Construcción y Agro de la Unión General de Trabajadores – UGT-FICA \(Spain\)](#)



[Universitat de València – UV-IRTIC \(Spain\)](#)



[European Construction Industry Federation – FIEC \(UE\)](#)



[European Federation of Building and Woodworkers – EFBWW \(UE\)](#)



[European Federation of Building and Woodworkers – EFBWW \(UE\)](#)



[Centre IFAPME Liège-Huy-Verviers \(Belgium\)](#)



[Cleantech \(Bulgary\)](#)



[CQ-EAD \(Bulgary\)](#)



[Panhellenic Association of Engineers Contractors of Public Works – PEDMEDE \(Greece\)](#)



[Berufsförderungswerk der Bauindustrie NRW gGmbH – BFW-NRW \(Germany\)](#)



[Technological University of the Shannon: Midlands Midwest – TUS \(Ireland\)](#)



[Associazione Nazionale Costruttori Edili – ANCE \(Italy\)](#)



[Ente per la Formazione e l'addestramento professionale nell'edilizia – FORMEDIL \(Italy\)](#)



[Institut de Formation Sectoriel du Bâtiment S.A. – IFSB \(Luxembourg\)](#)



[Federatia Patronatelor Societatilor din Constructii din Romania – FPSC \(Romania\)](#)



[German-Romanian Foundation Timisoara – FRG-Timisoara \(Romania\)](#)



[Chamber of Commerce and Industry of Slovenia – CCIS \(Slovenia\)](#)

With the aim of improving current curricula, Work Package 4 (WP4), 'Training programme addressing urgent skills needs in continuing vocational training,' was designed to respond quickly to market demands, enabling workers to meet the new requirements of today's labour market, through: 1) the identification of new and urgent skills needs in current construction professions, especially those related to digital and green issues; 2) Designing continuing vocational training programmes that respond to the urgent qualification needs of people of working age in the construction sector and 3) Ensuring the adoption and implementation of the training.

This report, '**Report on urgent skills in current occupations**', is framed within WP4 and is a key input for the subsequent development of training modules tailored to the challenges of the sector, considering national needs but providing a common supranational framework to strengthen the European industry across the board.

3. Methodology and Research analysis

The methodology adopted for this research was designed to identify and validate the construction sector skills requiring urgent upskilling to address the challenges posed by the green and digital transitions. These transitions are reshaping the industry, creating increased demand for technical, digital, and sustainability-related competencies. Given the diversity of the sector across ten consortium countries, a focused and systematic approach was essential to ensure feasibility, comparability, and alignment with European objectives.

3.1. Using ESCO and EQF as Reference Frameworks

The research relied on ESCO and EQF to ensure consistency and comparability across countries.

ESCO (European Skills, Competences, Qualifications and Occupations) is a multilingual classification system developed by the European Commission that provides a common reference for describing occupations, skills, and competences across the European labour market and education systems³. It supports comparability and alignment between countries by offering standardized definitions of occupations and their associated skills. It is available through



an online portal and can be consulted free of charge. The first full version was published in 2017, and the system has been continuously updated since⁴. **The European Qualifications Framework (EQF)** is an EU-wide reference system established in 2008 that enables comparison of qualifications across countries. It describes learning outcomes in terms of knowledge, skills, and competences across eight levels, rather than by education type or duration. EQF provides a common reference for qualification levels, allowing national frameworks to be mapped consistently and supporting transparency and mutual recognition of competences⁵.

Using these frameworks ensured that the research outputs could be compared across countries while remaining aligned with broader European initiatives, including the Skills Agenda and EURES.

The research followed a three-phased methodology to identify and validate the construction sector's most urgent skills needs across the Blueprint 2 consortium countries: Spain, Belgium, Bulgaria, Germany, Greece, Ireland, Italy, Luxemburg, Romania and Slovenia.

3 <https://esco.ec.europa.eu/en>

4 <https://esco.ec.europa.eu/en/about-esco/escopedia/escopedia/esco-versions>

5 For more information and recent publications on the European and National Qualification Frameworks: <https://www.cedefop.europa.eu/en/projects/european-qualifications-framework-eqf>

3.2. Phase 1 - Identification of occupations

Phase I focused on the identification of current occupations within the construction sector that require urgent⁶ upskilling⁷ to address the challenges posed by the green and digital transitions.

Before starting the activity, partners familiarized themselves with the European Qualifications Framework (EQF) and its alignment with national qualification frameworks by consulting the official referencing reports⁸. They also consulted the results of the BUILD UP Skills initiative⁹ or similar reports to ensure consistency with existing efforts. All responses were submitted at a national level.

The selection of occupations in need of urgent upskilling was made by the project consortium based on the **Occupations Matrix**, which had been prepared based on the ESCO classification. The Occupations matrix listed **54 construction occupations** from different professional groups (see Annex 1). Project partners were asked to indicate which of these occupations required urgent upskilling for the green and digital transitions in their respective countries, without forgetting transversal skills (soft and entrepreneurial skills, mainly). There was no minimum or maximum number of occupations to select, and partners were encouraged to base their choices on the desk research they had previously carried out. Partners also had the opportunity to suggest new or emergent occupations, a valuable input for future activities planned within the framework of the project.

Out of the 54 occupations, 13 were identified as urgent in at least 7 of the 10 countries participating in the Construction Blueprint 2 consortium. In particular, construction managers, insulation workers and carpenters and joiners were considered priority occupations by 8 of the partner countries. On the other hand, bricklayers, building electricians, construction general contractors, civil engineers, water engineers construction engineers, civil engineering technicians, energy conservation officers, HVAC engineering technicians and construction general supervisors were considered priority

occupations in 7 countries. It is worth noting none of the occupations were deemed unanimously as priority across all 10 partner countries. For Phase II, the focus shifted to a refined list of **10 occupations**, evenly split between blue-collar and white-collar roles. Narrower occupational profiles were consolidated into broader ESCO categorisations. For instance, construction general contractor (1321.1.1) was included under construction manager (1323.1) while water engineers (2142.1.11) and construction engineers (2142.1.2) were both included under civil engineer (2142.1).

3.3. Phase 2 - Prioritization of skills

Phase II began mapping the core skills required for the 10 occupations identified in Phase I. This mapping drew on the ESCO framework and incorporated resources from the EU project BuildSkills Academy¹⁰ and the BUILD UP Skills initiative¹¹, ensuring consistency and alignment with European standards, sectoral priorities, and recent European projects results.

The mapped skills encompassed a range of categories, covering digital, green, soft, and entrepreneurial competencies, reflecting the diverse knowledge and abilities required to meet the evolving demands of the construction sector. The core skills for each occupation were then incorporated into the **Urgent Skills Matrices (see Annex 2)**. Project partners were asked to review the list of selected occupations and their associated skills. For each skill, partners indicated its urgency in their national context using the following scale:

- 1 – Not Urgent: Can be addressed later without major impact
- 2 – Low Urgency: Worth considering, but not time-sensitive
- 3 – Urgent: Needs attention soon to avoid issues
- 4 – Very Urgent: Immediate action required to prevent serious consequences

Partners could also add one additional highly urgent skill per occupation if they identified a gap.

6 **Urgent skills** refer to the abilities and knowledge areas that are critically needed to fill immediate gaps in the workforce, adapt to fast-moving technological advances, shifting market demands, evolving regulations, and societal changes – particularly those driven by the green and digital transitions. The type of skills covers technical and soft skills, including green entrepreneurial and digital skills.

7 **Upskilling** refers to short-term targeted training typically provided following initial education or training, and aimed at supplementing, improving or updating knowledge, skills and competences (<https://www.cedefop.europa.eu/en/tools/vet-glossary/glossary?letter=U#glossary-150380>)

8 <https://europass.europa.eu/en/eqf-referencing-reports>

9 <https://build-up.ec.europa.eu/en/bup-skills>

10 <https://buildskillsacademy.com/>

11 <https://build-up.ec.europa.eu/en/bup-skills>

3.4. Phase 3 - Expert validation

Phase III focused on conducting interviews with key stakeholders in the construction sector to validate the most urgent skills needs for the ten identified occupations and to examine existing practices in Continuing Vocational Education and Training (cVET), which included Vocational Education and Training (VET) and Higher Education (HE)¹².

The interviews were based on the urgent skills matrix developed in Phase II and requested additional input from stakeholders (such as construction company managers, professional federations, R&D organizations, and cVET institutions). Each partner country conducted a minimum of three interviews, ensuring coverage of as many of the ten priority occupations as possible.



A. Profile of the interviewed experts

Country	Organisation	Position
Belgium	CEFORTEC	Coordinator, Training and Consulting Engineer
	Centre IFAPME LHV	Head trainer for construction trades
	Constructiv	Manager for Wallonia
	Embuild	1) Digital coordinator; 2) Digital advisor; 3) Economy & Digital Advisor; 4) Training and Consulting Engineer
Bulgaria	Bulgarian Construction Chamber (BCC)	Chairman of the Management Board
	Geostroy (construction company)	HR Manager
	FEDERATION OF INDEPENDENT CONSTRUCTION UNIONS under the Independent Trade Unions' Congress of Bulgaria and CVET provider (VET center Kolyu Ficheto)	1) Chairman; 2) Vice-chairman
Germany	Freelance	Architect
	Construction Company	Management & Urban Planner
Greece	Construction Company	HR Manager
	Construction Company	Construction professional specialized in Cement industry
	Construction Company	Construction Manager

12 According to CEDEFOP, CVET includes all learning carried out after initial education or training – or after entry into working life – which aims to improve or update knowledge, know-how and skills (upskilling); acquire new skills for a career move (retraining / reskilling); and support professional development. It includes both VET and HE institutions. <https://www.cedefop.europa.eu/en/tools/vet-glossary/glossary/berufliche-fort-und-weiterbildung>

Country	Organisation	Position
Ireland	SOLAS – National Further Education and Training (FET) Authority	Assistant Manager Climate Strategy & Skills
	Skills and Labour Market Research Unit (SLMRU)	Research manager
	Flexible and Work based Learning at TUS	DASBE Manager
Italy	Construction company	Business owner
	Formedil Avellino	Trainer/technician
	Formedil Chieti Pescara	Director/trainer
Luxembourg	Cocert S.A.	Technical director
	I.F.S.B.	Construction Engineer / Trainer
	I.F.S.B.	Trainer and Project Manager
Romania	Technology Enabled Construction Cluster	Project manager
	CONLAN SRL	Human Resource Responsible
	Elsaco Electronic SRL	Communications Manager
	Recon S.A.	General manager
Slovenia	Centre of the Republic of Slovenia for VET (CPI RS – NAVET body)	<ul style="list-style-type: none"> • Vocational Standards, National Vocational Qualifications, Linking Nonformal and Formal Education, • Supporting Sectoral Committee for Construction and Mining
	ELEA iC d.o.o.	BIM Manager and AI Strategy Lead, SME company-designer
	GIC GRADNJE d.o.o.	Head of Sustainability and Innovation, SME company-contractor
Spain	Federación de Empresas de La Rioja (FER)	Secretary of Associations
	UGT FICA	Construction Secretariat Collaborator
	Consejo Superior de Investigaciones Científicas (CSIC)	Senior Scientist
	Fundación Laboral de la Construcción (FLC)	Training Design Manager (Employment and Training Area)

Discussions covered key themes such as trends in the construction labour market, regulatory requirements for cVET, validation of the most urgent skills across the 10 occupations, and prioritization of training topics. Interviewees were also asked about existing training initiatives, cross-occupational skills need, emerging skills, and opportunities for improving training delivery methods. Innovative practices and potential partners for testing pilot training modules were also addressed. The detailed interview guidelines can be found in Annex 3.

Interviews were carried out either in person or online, with the urgent skills matrix shared in advance to facilitate discussion. National skills matrices validated by the experts were then compiled to identify the most urgent skills for each occupation across the 10 consortium countries.

Partners also provided a concise English summary for each interview, highlighting the main insights and recommendations from the experts.

3.5. Methodological Challenges

The process of identifying urgent skills needs across multiple countries presented several challenges:

Variability in Occupational Classifications

National occupational classifications vary widely, and many roles are not fully captured in ESCO. Selecting a limited set of occupations was essential to focus the skills analysis, but it also meant that the scope of investigation was necessarily concentrated on occupations most widely recognised across countries.

Differences in Qualification Frameworks

Although all EU countries reference their National Qualifications Frameworks to EQF, interpretations differ. EQF levels for the selected occupations were primarily based on the recent Centre of Vocational Excellence (CoVE) **BuildSkills Academy** project D2.1 report¹³, ensuring alignment with previous EU-funded research and avoiding duplication of efforts. In cases where no reference from BuildSkills Academy was available, EQF levels were assigned using additional sources and expert judgement to maintain consistency.

Dynamic and Transversal Skills Needs

Skills requirements are rapidly evolving due to technological innovation, regulatory changes, and green and digital transitions. Many urgent skills, particularly digital, green, and entrepreneurial competencies, are transversal and cut across multiple occupations, complicating the identification of occupation-specific priorities without overlooking emerging requirements.

Cross-Country Comparability

Differences in labour markets, occupational structures, and policy priorities created variability in data and interpretation. While ESCO and EQF provided a common framework, national contextualisation and expert validation were essential to ensure that the selected skills were relevant and urgent in each country.

3.6. Addressing the Methodological Challenges

To overcome these challenges, the methodology integrated structured reference tools and participatory validation mechanisms:

- **Occupations and Skills Matrices**, based on ESCO, provided a harmonised framework for partner contributions and helped narrow the focus to the most relevant roles.
- **Expert consultations** ensured that skills needs were contextualised, emerging trends were captured, and results reflected both European trends and national realities.

This combined approach ensured that the skills identified were not only recognised as urgent in light of the green and digital transitions but also defined in a way that makes them practical to address. By integrating structured frameworks such as ESCO and EQF with expert validation, the process ensured both consistency and contextual relevance across all consortium countries.



13 BuildSkillsAcademy, Deliverable 2.1 - List of skills and competences for different occupations and EQF levels in the construction sector, 24/01/2024, https://buildskillsacademy.com/wp-content/uploads/2024/05/BSA_DEL_2.1.pdf.

4. Occupations in need of upskilling

Building on the methodology outlined above, this section presents the 10 occupations prioritized by the Construction Blueprint 2 consortium as requiring urgent upskilling to address the challenges of the green and digital transitions in the construction sector, as well as the importance of transversal skills. These occupations were selected by at least seven countries of the consortium as “Urgent” or “Very Urgent”, from an initial matrix of 54 roles, based on the ESCO classification, and validated through inputs from project partners.

The final selection ensures a balanced representation of both blue-collar (Section 3.1) and white-collar (Section 3.2) profiles, thus covering a wide spectrum of occupations across the construction value chain.

For each occupation, the following information is provided:

- The ESCO code and description
- A link to the corresponding ESCO entry for further reference
- The European Qualifications Framework (EQF) level, building on the insights from the *BuildSkillsAcademy* project already mentioned. EQF levels were assigned using additional sources and expert judgement wherever information was not available.

4.1. Blue collar occupations

The five blue-collar profiles identified as requiring urgent upskilling due to the green and digital transitions are outlined below. These roles are predominantly linked to on-site construction activities and involve specialised technical competences that are increasingly impacted by new technologies, environmental standards, and sustainability requirements.

Carpenters and joiners	
ESCO code: 7115.1	ESCO description: Carpenters cut, shape and assemble wooden elements for the construction of buildings and other structures. They also use materials such as plastic and metal in their creations. Carpenters create the wooden frames to support wood framed buildings.
Link to ESCO	
EQF level: EQF 1-4	
Insulation workers	
ESCO code: 7124.1	ESCO description: Insulation workers install a variety of insulation materials to shield a structure or materials from heat, cold, and noise from the environment.
Link to ESCO	
EQF level: EQF 1-4	
Bricklayers	
ESCO code: 7112.1	ESCO description: Bricklayers assemble brick walls and structures by skilfully laying the bricks in an established pattern, using a binding agent like cement to bond the bricks together. They then fill the joints with mortar or other suitable materials
Link to ESCO	
EQF level: EQF 1-4	

Building electricians	
ESCO code: 7411.1.1	ESCO description: Building electricians install and maintain electricity cables and other electrical infrastructure in buildings. They make sure installed electrical equipment is isolated and presents no fire hazards. They understand existing situations and make improvements if called for.
Link to ESCO	
EQF level: EQF 1-4	
HVAC engineering technicians	
ESCO code: 3115.1.5	ESCO description: Heating, ventilation, air conditioning and refrigeration engineering technicians aid in the design of devices which provide heating, ventilation, air conditioning and possibly refrigeration in buildings. They ensure the equipment complies with environmental standards. They handle hazardous materials used in the systems and ensure safety precautions are in place.
Link to ESCO	
EQF level: 1-4	

4.2. White collar occupations

The five white-collar profiles identified as requiring urgent upskilling are primarily associated with the planning, management, and coordination of construction activities.

These roles play a critical part in integrating sustainable practices, implementing digital solutions, and ensuring compliance with evolving regulatory frameworks.

Construction Managers	
ESCO code: 1323.1	ESCO description: Construction managers are responsible for the planning and coordination of the construction projects. They provide expertise in the design phase of construction projects by facilitating a better estimate of the costs and the functional implications. They participate on bid processes for construction projects and handle subcontractors to deliver the different stages of the construction process from beginning to completion. They strive to enhance the value of the projects both improving efficiency and creating value for customers.
Link to ESCO	
EQF level: 5-8	
Civil Engineers	
ESCO code: 2142.1	ESCO description: Civil engineering technicians help design and execute construction plans and take on organisational tasks, for example in the planning and monitoring, and in bidding and invoicing of construction work. They also calculate material requirements, and help with the purchasing and organising, and ensure the quality of the construction materials. Civil engineering technicians may perform technical tasks in civil engineering and develop and advise on policy implementing strategies for road works, traffic lights, sewerage and water management systems.
Link to ESCO	
EQF level: 5-8	
Energy Management Officers	
ESCO code: 3112.6	ESCO description: Energy management officers promote the conservation of energy in both residential homes as in businesses. They advise people on ways to reduce their power consumption by enforcing energy efficiency improvements and implementing energy demand management policies
Link to ESCO	
EQF level: 5-8	
Construction General Supervisor	
ESCO code: 3123.1	ESCO description: Construction general supervisors keep track of the proceedings of all stages in the building process. They coordinate the different teams, assign tasks, and resolve problems.
Link to ESCO	
EQF level: EQF 5-8	

5. Validated urgent skills

5.1. Carpenters and joiners

■ Very Urgent
 ■ Urgent
 ■ Not selected

Skills highlighted as Very Urgent by at least 5 countries

Skills identified as urgent/very urgent	BE	BG	DE	GR	IE	IT	LU	RO	ES	SI
Ensure overall compliance with construction project requirements, including deadlines, safety regulations, and technical parameters.	Very Urgent	Very Urgent	Very Urgent	Urgent	Very Urgent	Very Urgent	Urgent	Very Urgent	Not selected	Urgent
Apply the relevant health and safety procedures in construction in order to prevent accidents, pollution and other risks.	Urgent	Very Urgent	Very Urgent	Urgent	Very Urgent	Very Urgent	Urgent	Very Urgent	Urgent	Urgent
Health and safety: work ergonomically, Follow health and safety procedures in construction	Urgent	Very Urgent	Very Urgent	Urgent	Urgent	Very Urgent	Urgent	Very Urgent	Very Urgent	Urgent
Apply insulation strips, which prevent air exchange between outdoors and indoors areas.	Very Urgent	Very Urgent	Very Urgent	Urgent	Very Urgent	Not selected	Urgent	Not selected	Urgent	Urgent
Use safety equipment in construction	Not selected	Very Urgent	Very Urgent	Urgent	Urgent	Very Urgent	Urgent	Very Urgent	Not selected	Urgent
Use measurement instruments	Very Urgent	Very Urgent	Very Urgent	Urgent	Urgent	Not selected	Not selected	Very Urgent	Not selected	Urgent
Assembly and maintenance of aluminium and PVC exterior carpentry	Urgent	Very Urgent	Very Urgent	Urgent	Not selected	Not selected	Not selected	Very Urgent	Very Urgent	Very Urgent
Calculate needs for construction supplies	Urgent	Urgent	Very Urgent	Not selected	Urgent	Very Urgent	Not selected	Very Urgent	Not selected	Urgent
Estimate duration of work	Urgent	Urgent	Very Urgent	Urgent	Urgent	Very Urgent	Not selected	Very Urgent	Not selected	Urgent
Prevent damage to utility infrastructure	Urgent	Very Urgent	Urgent	Not selected	Very Urgent	Not selected	Urgent	Very Urgent	Not selected	Urgent
Work in a construction team	Urgent	Very Urgent	Very Urgent	Urgent	Not selected	Not selected	Urgent	Very Urgent	Not selected	Not selected
Dispose of waste materials which pose no risk to health and safety in a manner which complies with recycling and waste management procedures.	Urgent	Urgent	Urgent	Urgent	Urgent	Very Urgent	Not selected	Very Urgent	Not selected	Urgent
Promote environmental awareness	Very Urgent	Not selected	Urgent	Not selected	Very Urgent	Not selected	Urgent	Not selected	Not selected	Urgent
Set up the desired product design in the CNC controller of the CNC machine for product manufacturing.	Very Urgent	Urgent	Very Urgent	Urgent	Urgent	Not selected	Not selected	Not selected	Not selected	Urgent
Inspect construction supplies	Urgent	Urgent	Very Urgent	Not selected	Urgent	Not selected	Not selected	Not selected	Not selected	Not selected
Coordinate engineering project management activities, ensuring budgetary control, scheduling of tasks, and adherence to health and safety regulations	Not selected	Not selected	Very Urgent	Not selected	Urgent	Not selected	Urgent	Not selected	Urgent	Urgent
Oversee construction project	Not selected	Not selected	Very Urgent	Not selected	Urgent	Not selected	Urgent	Not selected	Not selected	Urgent
Set up temporary construction site infrastructure	Urgent	Urgent	Very Urgent	Not selected	Urgent	Not selected	Not selected	Not selected	Not selected	Urgent
Use CAD software for drawings	Urgent	Urgent	Urgent	Very Urgent	Urgent	Not selected	Not selected	Urgent	Not selected	Urgent

Skills identified as urgent/very urgent	BE	BG	DE	GR	IE	IT	LU	RO	ES	SI
Inform on workplace safety standards	Not selected	Urgent	Urgent	Urgent	Very Urgent	Urgent	Urgent	Urgent	Urgent	Not selected
Inspect building systems	Not selected	Urgent	Urgent	Not selected	Not selected	Not selected	Urgent	Not selected	Urgent	Not selected
Manage health and safety standards	Urgent	Urgent	Urgent	Urgent	Very Urgent	Very Urgent	Urgent	Urgent	Not selected	Not selected
Negotiate with stakeholders	Not selected	Urgent	Not selected	Not selected	Very Urgent	Not selected	Urgent	Not selected	Not selected	Urgent
Review construction projects	Not selected	Urgent	Urgent	Urgent	Urgent	Not selected	Urgent	Urgent	Not selected	Urgent
Advise architects	Not selected	Not selected	Urgent	Not selected	Urgent	Not selected	Urgent	Not selected	Not selected	Not selected
Conduct fire safety inspections	Not selected	Urgent	Urgent	Urgent	Urgent	Not selected	Not selected	Urgent	Not selected	Not selected
Conduct land surveys	Not selected	Urgent	Urgent	Not selected	Not selected	Not selected	Urgent	Not selected	Not selected	Not selected
Manage construction archive	Not selected	Not selected	Not selected	Not selected	Not selected	Not selected	Urgent	Not selected	Not selected	Urgent
Monitor parameters' compliance in construction projects	Not selected	Urgent	Not selected	Not selected	Not selected	Not selected	Not selected	Not selected	Not selected	Urgent
Perform field research	Not selected	Not selected	Not selected	Not selected	Not selected	Not selected	Not selected	Not selected	Not selected	Urgent
Write inspection reports	Not selected	Not selected	Urgent	Not selected	Urgent	Urgent	Urgent	Not selected	Not selected	Not selected

5.3. Bricklayers

Very Urgent
 Urgent
 Not selected
 Skills highlighted as Very Urgent by at least 5 countries

Skills identified as urgent/very urgent	BE	BG	DE	GR	IE	IT	LU	RO	ES	SI
Sort waste and demolition materials	Urgent	Very Urgent	Urgent	Very Urgent	Very Urgent	Very Urgent	Very Urgent	Very Urgent	Urgent	Urgent
Interpretation of 2D and 3D map	Very Urgent	Very Urgent	Urgent	Very Urgent	Urgent	Urgent	Very Urgent	Not selected	Urgent	Very Urgent
Ensure overall compliance with construction project requirements, including deadlines, safety regulations, and technical parameters.	Very Urgent	Urgent	Urgent	Very Urgent	Urgent	Urgent	Very Urgent	Not selected	Urgent	Very Urgent
Recognize impact of materials lifetime for maintenance and demolition	Urgent	Very Urgent	Not selected	Very Urgent	Urgent	Urgent	Very Urgent	Urgent	Urgent	Urgent
Calculate need for construction supplies	Not selected	Very Urgent	Not selected	Very Urgent	Urgent	Urgent	Very Urgent	Urgent	Urgent	Urgent
Read standard blueprints	Very Urgent	Urgent	Not selected	Very Urgent	Urgent	Urgent	Not selected	Not selected	Urgent	Very Urgent
Modular construction: interpret plans and install connection of modular building elements	Urgent	Urgent	Urgent	Very Urgent	Urgent	Urgent	Very Urgent	Urgent	Urgent	Urgent
Prepare the envelope for PV walls	Urgent	Urgent	Urgent	Very Urgent	Not selected	Not selected	Very Urgent	Urgent	Urgent	Very Urgent
Manage health and safety standards and follow procedures	Urgent	Urgent	Urgent	Very Urgent	Very Urgent	Urgent	Urgent	Very Urgent	Urgent	Urgent

Skills identified as urgent/very urgent	BE	BG	DE	GR	IE	IT	LU	RO	ES	SI
Identify customer objectives	Urgent	Very Urgent	Not selected	Very Urgent	Urgent	Urgent	Urgent	Not selected	Urgent	Urgent
Inspect construction supplies	Not selected	Very Urgent	Not selected	Very Urgent	Not selected	Not selected	Not selected	Not selected	Not selected	Not selected
Manage contracts	Not selected	Very Urgent	Not selected	Very Urgent	Not selected	Urgent	Not selected	Not selected	Not selected	Not selected
Monitor construction site and contractor performance	Not selected	Very Urgent	Urgent	Not selected	Not selected	Urgent	Very Urgent	Urgent	Not selected	Urgent
Audit contractors	Not selected	Very Urgent	Not selected	Not selected	Not selected	Not selected	Not selected	Not selected	Not selected	Not selected
Coordinate construction activities and marketing plan actions	Urgent	Very Urgent	Not selected	Not selected	Not selected	Not selected	Not selected	Not selected	Urgent	Urgent
Keep records of work progress	Not selected	Urgent	Not selected	Very Urgent	Not selected	Not selected	Urgent	Not selected	Not selected	Not selected
Perform project management	Not selected	Urgent	Very Urgent	Urgent	Not selected	Urgent	Not selected	Not selected	Urgent	Not selected
Perform quality control of design during a run	Very Urgent	Urgent	Urgent	Not selected	Urgent	Urgent	Urgent	Not selected	Not selected	Very Urgent
Plan shifts of employees	Not selected	Very Urgent	Not selected	Urgent	Not selected	Urgent	Not selected	Not selected	Not selected	Not selected
Plan allocation of space	Very Urgent	Urgent	Urgent	Urgent	Not selected	Urgent	Urgent	Not selected	Not selected	Very Urgent
Advise architects	Not selected	Urgent	Not selected	Not selected	Not selected	Not selected	Not selected	Not selected	Not selected	Not selected
Review construction projects	Not selected	Urgent	Not selected	Not selected	Not selected	Not selected	Urgent	Not selected	Urgent	Not selected

5.4. Building electricians

■ Very Urgent
 ■ Urgent
 ■ Not selected

Skills highlighted as Very Urgent by at least 5 countries

Skills identified as urgent/very urgent (3-4)	BE	BG	DE	GR	IE	IT	LU	RO	ES	SI
Follow health and safety procedures in construction and working in heights and ensure safety in electrical power operations	Very Urgent	Very Urgent	Very Urgent	Urgent	Very Urgent	Very Urgent	Urgent	Not selected	Very Urgent	Urgent
Mount photovoltaic panels	Very Urgent	Not selected	Not selected	Urgent	Very Urgent	Very Urgent	Urgent	Not selected	Very Urgent	Urgent
Perform a test run and adjust voltage	Very Urgent	Very Urgent	Very Urgent	Urgent	Very Urgent	Very Urgent	Not selected	Urgent	Not selected	Urgent
Create solutions to problems	Very Urgent	Very Urgent	Urgent	Urgent	Very Urgent	Very Urgent	Very Urgent	Not selected	Not selected	Urgent
Ensure compliance with environmental and safety legislation	Very Urgent	Not selected	Very Urgent	Urgent	Very Urgent	Very Urgent	Urgent	Very Urgent	Urgent	Urgent
Install smart devices	Not selected	Very Urgent	Very Urgent	Urgent	Very Urgent	Very Urgent	Urgent	Very Urgent	Urgent	Urgent
Installation of circuit breakers, heating boilers and heating furnace	Very Urgent	Very Urgent	Very Urgent	Urgent	Very Urgent	Not selected	Not selected	Urgent	Not selected	Not selected
Make electrical calculations	Very Urgent	Not selected	Very Urgent	Not selected	Very Urgent	Very Urgent	Urgent	Not selected	Urgent	Urgent
Operate electronic measuring instruments	Not selected	Very Urgent	Very Urgent	Not selected	Very Urgent	Very Urgent	Not selected	Not selected	Urgent	Urgent

5.7. Civil engineers

Very Urgent
 Urgent
 Not selected

Skills highlighted as Very Urgent by at least 5 countries

Skills identified as urgent/very urgent (3-4)	BE	BG	DE	GR	IE	IT	LU	RO	ES	SI
Advise on environmental protection – communicate on environmental impact of mining, advise on building materials, pollution prevention, soil and water protection, environmental remediation, mining environmental issues, waste management										
Follow health and safety procedures in construction										
Perform and manage engineering projects										
Design sustainable building systems – design passive energy measures, insulation concepts, building envelope systems, air tightness, and window/glazing systems										
Conduct site inspections and audits – conduct engineering site audits, inspect facility sites, inspect industrial equipment										
Promote sustainability, environmental awareness, and use of green materials										
Assess resource life cycles and apply circular economy principles										
Ensure compliance with environmental legislation, including Restriction of Hazardous Substances (RoHS)/ Waste Electrical and Electronic Equipment (WEEE) regulations										
Evaluate integrated design of buildings - Use goals and targets as means of measuring success of design proposals. Apply, combine and evaluate advanced methods for analysis of the interplay between energy systems, architectural concepts, building design, building use, outdoor climate and HVAC systems.										
Perform and advise on environmental audits and assessments – assess environmental impact, carry out environmental audits, conduct environmental surveys, analyse environmental data, communicate on environmental impact of mining										
Investigate and mitigate environmental risks – investigate contamination, mitigate environmental impact of pipeline projects										
Perform selective demolition and assess reusability of materials										
Design and manage renewable energy systems – design geothermal systems, wind turbines, wind farm collector systems, provide information on wind turbines, solar panels, geothermal pumps, research ocean energy projects, research locations for wind farms										
Adjust and design engineering systems										

5.8. Civil engineering technicians

Very Urgent
 Urgent
 Not selected

Skills highlighted as Very Urgent by at least 5 countries

Skills identified as urgent/very urgent (3-4)	BE	BG	DE	GR	IE	IT	LU	RO	ES	SI
Follow health and safety procedures in construction	Very Urgent	Very Urgent	Very Urgent	Urgent	Very Urgent	Very Urgent	Not selected	Very Urgent	Urgent	Urgent
Construction Planning and Scheduling – estimate duration of work, manage schedule of tasks, keep records of work progress, control of expenses, manage budgets	Very Urgent	Very Urgent	Very Urgent	Not selected	Very Urgent	Urgent	Not selected	Very Urgent	Not selected	Urgent
Construction Site Management – oversee construction project, manage engineering project, set up temporary construction site infrastructure	Very Urgent	Very Urgent	Very Urgent	Not selected	Very Urgent	Urgent	Not selected	Very Urgent	Not selected	Urgent
Building and Material Advising – advise on building matters, advise on construction materials, inspect construction supplies, calculate needs for construction supplies	Very Urgent	Very Urgent	Very Urgent	Very Urgent	Very Urgent	Urgent	Not selected	Urgent	Not selected	Urgent
Prevent damage to utility infrastructure	Very Urgent	Very Urgent	Very Urgent	Urgent	Very Urgent	Urgent	Not selected	Very Urgent	Not selected	Urgent
Work in a construction team	Urgent	Very Urgent	Very Urgent	Not selected	Very Urgent	Very Urgent	Not selected	Not selected	Not selected	Urgent
Field Research and Surveying – conduct land surveys, perform field research, use measurement instruments, operate drones in civil engineering	Very Urgent	Not selected	Urgent	Very Urgent	Very Urgent	Urgent	Urgent	Urgent	Not selected	Urgent
Project Compliance and Coordination – liaise with architects, ensure compliance with construction project deadline, monitor parameters' compliance in construction projects, obtain relevant licenses, assess financial viability	Very Urgent	Very Urgent	Very Urgent	Urgent	Urgent	Urgent	Urgent	Urgent	Urgent	Not selected
Work ergonomically, work in a construction team	Urgent	Very Urgent	Very Urgent	Not selected	Very Urgent	Not selected	Not selected	Not selected	Not selected	Urgent
Use CAD and technical drawing software	Very Urgent	Urgent	Not selected	Urgent	Very Urgent	Urgent	Urgent	Very Urgent	Not selected	Urgent
ICT and Software Use – use ICT systems, file documents, use spreadsheets software	Urgent	Very Urgent	Urgent	Not selected	Very Urgent	Not selected	Urgent	Very Urgent	Not selected	Urgent
Environmental Education and Awareness – promote environmental awareness, educate on recycling regulations, train staff on waste management	Urgent	Urgent	Not selected	Urgent	Very Urgent	Very Urgent	Very Urgent	Urgent	Urgent	Urgent
Waste Management Strategy and Regulation – advise on waste management procedures, coordinate waste management procedures, inspect recycling procedures, assess waste type, identify new recycling opportunities	Very Urgent	Urgent	Not selected	Urgent	Very Urgent	Urgent	Urgent	Very Urgent	Urgent	Urgent
Environmental Compliance and Control – ensure compliance with environmental legislation, follow procedures to control substances hazardous to health, assess environmental impact	Very Urgent	Urgent	Not selected	Urgent	Very Urgent	Urgent	Not selected	Very Urgent	Urgent	Urgent
Address problems critically	Urgent	Very Urgent	Urgent	Urgent	Very Urgent	Very Urgent	Urgent	Urgent	Not selected	Not selected

6. Insights of cVET stakeholders

Disclaimer regarding interviewee statements and the summarized topics:

Although this section is presented within a national framework, it must be emphasized that the assessments provided do not represent state, regional, or legislative positions. These contributions solely reflect the perspectives of the professionals interviewed and should not be interpreted as indicative of institutional or sector-wide consensus at the national level.

6.1. Belgium

Belgium

Skills Shortages and Urgent Training Needs identified by experts

Which occupations require the most urgent skills, what are the most pressing green, digital, entrepreneurial, and soft skills identified, and how do these differ between white- and blue-collar jobs?

Electricians have the highest number of very urgent skills (21), followed by **HVAC Technicians** (8), **Insulation Workers** (7), **Carpenters/Joiners** (6), and **Bricklayers** (5).

Very urgent green skills are well-represented across multiple occupations. **Carpenters/Joiners** are expected to promote environmental awareness and install circular and bio-based construction materials, such as hempcrete and wood fiber panels. **Insulation Workers** use digital tools for energy efficiency assessments and must understand the composition and application of insulation materials. **Electricians** have several green responsibilities: ensuring compliance with environmental and safety legislation, instructing energy-saving technologies, identifying energy demand, calculating and sizing renewable generation systems, mounting photovoltaic panels, and installing and maintaining EV charging stations. **HVAC Technicians** also contribute to sustainability through tasks such as maintaining heat pump systems and ensuring compliance with environmental legislation.

Very urgent digital skills are also widespread. **Carpenters/Joiners** operate CNC machines using digital controllers. **Insulation Workers** use digital diagnostic tools for energy efficiency. Both **Bricklayers** and **HVAC Technicians** must interpret 2D and 3D plans, a key digital competency in modern construction. **Electricians** create technical plans using drawing software, and **HVAC Technicians** work with Building Automation Systems (BAS) and smart thermostats for HVAC control. Digital literacy, therefore, emerges as a shared requirement across all professions.

Transversal skills:

- **Very urgent entrepreneurial skills** appear exclusively for **Electricians**. These include the ability to build business relationships and carry out project management tasks such as coordinating workflows, interpreting technical documentation, supervising engineering projects, training staff, and addressing operational issues.
- **Very urgent soft skills** are also explicitly listed only for **Electricians**. These include communicating with customers, applying technical communication skills, and creating solutions to problems, critical competencies for client engagement, teamwork, and adaptability on the job.

Trends in the Construction Sector and CVET

How is the construction labour market evolving in your country, in terms of workforce demand, job vacancies, and required skills, and are there any legal or regulatory requirements for cVET in the sector—and if so, what are the main obligations for companies and workers?

The construction sector is experiencing **severe and persistent recruitment difficulties**. In Wallonia alone, there are currently **6,000-7,000 unfilled positions**, and future renovation/energy-efficiency regulations could require an **additional 35,000 workers**. Recruitment is hindered by several factors:

- A **scarcity of qualified candidates**, due to a lack of experience, insufficient technical skills, or incomplete training.
- A **decline in the number of graduates** from vocational and qualifying education programs.
- **Job-related constraints**, such as unattractive working hours, low wages, and the physically demanding nature of the work.
- Growing reliance on **soft skills over formal qualifications**, as employers are forced to recruit based on basic behavioural traits (punctuality, client communication, etc.) and then direct new hires to external training pathways (e.g., IFAPME or Forem).

The sector also faces **critical turnover**, with companies frequently poaching scarce skilled workers. This destabilises the labour market and especially affects SMEs struggling to retain staff. Training now prioritises **short, fast-track programs for general labourers** over developing long-term specialists, further widening the gap between available profiles and employers' needs, particularly in specialised roles.

The sector is subject to **extensive mandatory training in health, safety, and technical competencies**, based on national legislation and EU directives, particularly in fields like HVAC, electrical safety, and chemical handling. Many certifications are **not included in initial vocational education**, requiring workers to pursue them once employed. Employers are legally obliged to provide these courses with regular updates and refresher sessions. The sector must also adapt to an expanding list of regulatory requirements and certification standards. Currently, there is no legal requirement for digital skills training, though this may be introduced with future digitalisation measures such as electronic invoicing.

Prioritisation of Training Topics

Do you know of existing trainings that already address, fully or partially, the identified skills gaps, and what urgent skills are required across the construction sector as a whole, as well as emerging skills not yet covered but relevant to these ten occupations?

Belgium's construction sector provides a solid base of mandatory training, but major gaps persist in both content and accessibility. Practical skills in HVAC maintenance, environmental compliance, and sustainable construction are insufficiently covered, especially in initial education, and existing modules are often limited to job seekers or unavailable in short formats for employed workers.

Initial training should focus on core trade skills, while **CVET** should build specialised or emerging competencies, yet SMEs struggle to implement CVET due to cost, time constraints and labour shortages. There are also concerns about how training frameworks adapt to evolving industry needs. **Upskilling existing trades** (e.g., bricklayers, roofers) is seen as more efficient than creating new job categories (like "insulation workers").

Skill gaps exist across technical, sustainability, digitalisation, and coordination areas. HVAC shows a critical gap in aligning on-site work with specifications and energy performance standards, while sustainable construction skills—deconstruction, reuse, bio-based and low-carbon materials, airtightness, and thermal bridge management—remain underdeveloped. Digital needs include quoting, planning, ERP, and tools like BIM viewers, 3D visualisation (LIDAR, 360° cameras), and CAD for project data interpretation. Soft skills such as team cohesion, communication, and adaptability are also a priority but often overlooked.

Emerging trends include **hydrogen** training, increased use of **BIM for project management**, and **revival of traditional low-impact techniques** like raw earth and thatch, reflecting a move toward sustainable, digital, and integrated construction practices.

Belgium

Training Delivery and Innovation

How could cVET in the construction sector be improved in your country in terms of duration, frequency, and format (in-person, remote, hybrid), what innovative methods or best practices could enhance its delivery?

Improving cVET in the construction sector is less about changing training formats and more about **reinforcing mandatory certifications** to raise service quality. However, several areas for enhancement are identified:

- **Stronger links between training and workplace realities** are needed, particularly through **work-based learning and apprenticeships**. Current programs often fail to reflect on-site expectations, especially regarding communication, teamwork, and administrative tasks.
- **Time constraints** remain a major barrier (as companies struggle to release workers for training without incurring productivity losses) though support measures exist (winter training, sector incentives).

Ultimately, training must evolve in step with the changing nature of construction jobs, combining technical, relational, and digital skills.

Best practices stress **in-company/work-based learning**, peer-to-peer sharing, and using experienced workers. **Hands-on training** is preferred to theory, reflecting sector culture. **Hybrid models** combining in-person/remote formats work well, especially for digital tools (BIM, management software). **Winter scheduling** and active promotion of worker training rights enhance participation.

6.2. Bulgaria

Bulgaria

Skills Shortages and Urgent Training Needs identified by experts

Which occupations require the most urgent skills, what are the most pressing green, digital, entrepreneurial, and soft skills identified, and how do these differ between white- and blue-collar jobs?

Transversal skills:

The lack of soft skills listed is a major barrier for the construction sector. These skills are essential, especially for team leaders which are in demand in the sector in general and have been clearly pointed by the interviewees as pivotal for the sector in its modernization and transition. Those skills are leadership, emotional intelligence, conflict resolution, skills for understanding the entire process as a flow, intersectoral knowledge, adequate communication skills, provision of feedback. Organizational and time management are also important skills, as they are related to planning work in stages, adhering to schedules, avoiding delays.

Digital skills:

Basic IT skills and working with digital technologies: extremely important for construction workers. The skills of using mobile applications for construction control, online project platforms, digital drawings, working with Excel and CAD programs, all of this is related to professions such as construction engineers, technicians, project managers, even foremen.

Trends in the Construction Sector and CVET

How is the construction labour market evolving in your country, in terms of workforce demand, job vacancies, and required skills, and are there any legal or regulatory requirements for cVET in the sector—and if so, what are the main obligations for companies and workers?

In the recent years - dynamic changes and a growing demand for qualified labour. What is currently being observed is a clear shortage of personnel – building technicians and lower skills positions.

Among the most demanded professions in the sector are welders, electricians, plumbers, system installers and civil engineers. Employers are increasingly looking for people possessing not only the traditional practical experience, but also specific technical skills such as BIM proficiency, energy efficiency, use of new building materials, working with design software and skills in implementing sustainable and “green” construction solutions. Additionally, the workforce demand is reinforced by challenges such as aging population, low qualifications of some workers, and migration of personnel. Construction is perceived as unattractive, especially for young people. On the other hand, the growth in labour demand is supported by the positive economic forecasts for the sector - the construction industry in Bulgaria is expected to grow by about 4% annually until 2029.

In the construction sector in Bulgaria there are specific legal and regulatory requirements that regulate continuous professional education and training. They aim not only to improve the qualifications of workers, but also to ensure the safety of the work process.

Companies are obliged to provide periodic training - at least once a year, especially on Occupational Health and Safety (OHS) and training when implementing new technologies or materials, sending employees to mandatory courses (e.g. crane operators, electricians, welders, etc.) for activities requiring certified qualification. Additionally, the employers' responsibility is not limited to providing training only - they must also bear the costs of it when it is related to a mandatory qualification for the specific position or a legal requirement. At the same time, employees are obliged to signal the need for additional training and to participate in training organized by the employer, maintaining their qualifications - especially when this is a condition for safe work. It is necessary to pass knowledge assessments when required, as well as to present valid certificates of competence when the profession requires it.

Prioritisation of Training Topics

Do you know of existing trainings that already address, fully or partially, the identified skills gaps, and what urgent skills are required across the construction sector as a whole, as well as emerging skills not yet covered but relevant to these ten occupations?

In recent years, there has been a progress in the provision of training aimed specifically at addressing the skills gaps of construction workers. Some of these trainings are implemented under national and European projects such as the BUILD UP Skills initiative and the BuildSkills Academy, others are organized by professional centres and trade union partners, and some are also offered by higher education institutions.

There are several existing VET centres which deliver trainings and initiatives which fully or partially cover the identified skills gaps in the construction sector such as Construction Qualification, VET Center Kolyu Ficheto (under the FEDERATION OF INDEPENDENT CONSTRUCTION UNIONS) but they cannot cover the demand of the construction companies in terms of topics and pace of development. For this reason, big construction companies establish own VET centres to secure the supply of reskilling and upskilling. This leads to segmented construction skills landscape and lack of consolidated approach to developing skills in common occupations as every single VET serves the need of the specific company.

There is a clear need for the establishment of college or similar CVET structure which will serve the needs of the entire sector in terms of topics and pace of content development.

Especially in the case of Civil engineer – technical skills are already existing, managerial skills are more needed. Therefore, the feedback from the interviews is to include more managerial skills to compensate on this side of the occupation.

Bulgaria

Additionally, digital skills in construction should be strengthened to reflect the ambitions for digitalization of the sector on EU level. BIM software skills are becoming standard for engineers, technicians and managers. There is also an increased interest in using drones and laser scanning to capture and inspect objects, which is especially useful for technicians and surveyors. With the increasing number of “smart” buildings, an understanding of IoT technologies is also required – reading data from energy, temperature and pressure sensors.

An important trend is the need for sustainable construction – knowledge of carbon footprint, eco-materials and green standards are becoming valuable for designers and energy managers. With digitalization, there is also a need for basic cybersecurity – especially when working with digital platforms and sensitive data. Waste management and circular economy skills are also increasingly relevant.

Training Delivery and Innovation

How could cVET in the construction sector be improved in your country in terms of duration, frequency, and format (in-person, remote, hybrid), what innovative methods or best practices could enhance its delivery?

The interviewees validated the use of short, targeted courses as most appropriate for bridging the gaps in the sector and therefore they support the development of micro-credentials as an optimal format. However, trainings need to have clear practical focus.

The requirement for frequency of trainings in the Bulgarian construction sector is usually for an annual basis which is evaluated as appropriate but more frequent trainings (for example twice a year) are also seen as valuable in the event of regulatory changes.

Hybrid formats are seen as most valuable as they integrate in-person and online interventions allowing flexibility. Also, they can easily accommodate practical modules which is an advantage. An additional recommendation is to engage employers and include real company cases and equipment in the training. Practical education (on the construction site) is generally missing in Bulgaria leading to severe lack of practical skills. There is a clear need for internship and apprenticeship programmes on site. At the moment, dual education is not implemented at all, and this is a must. Another recommendation is to increase financial incentives for participation in training (vouchers, employer bonuses, covering travel expenses) to stimulate workers.

On a country level, the focus should be on modernizing and improving the system of continuing vocational education and training (CVET) by introducing flexible, practically oriented and technologically supported training formats. The sector needs a sustainable framework for acquiring and upgrading skills, tailored to the needs of construction workers and employers. Only through this will the country and the sector achieve sustainable improvement of qualifications, increased mobility and competitiveness of the workforce, and an improved connection between education and real business.

6.3. Germany

Germany

Skills Shortages and Urgent Training Needs identified by experts

Which occupations require the most urgent skills, what are the most pressing green, digital, entrepreneurial, and soft skills identified, and how do these differ between white- and blue-collar jobs?

The following insights are based on interviews with German sector experts, mapped to the ESCO occupations prioritized in Construction Blueprint 2. The findings reflect current trends and urgent skills needs in Germany's construction sector, especially regarding the green and digital transitions. Please note that these are expert opinions and do not represent official positions.

Urgently needed professions: Construction managers, Civil engineers and Building Electricians

Key skills:

- **Green:** life cycle analysis, CO₂ balancing, circular economy.
- **Digital:** BIM, drone surveying, project software.
- **Entrepreneurial:** Project management, change management.

Soft skills: interdisciplinary collaboration

Differences: White-collar roles require more digital and planning skills, blue-collar roles focus more on practical implementation and safety.

Trends in the Construction Sector and CVET

How is the construction labour market evolving in your country, in terms of workforce demand, job vacancies, and required skills, and are there any legal or regulatory requirements for cVET in the sector—and if so, what are the main obligations for companies and workers?

Residential construction is declining, with a focus on renovation and energy efficiency. 81% of companies report a shortage of skilled workers. Mandatory training exists for occupational safety (DGUV), energy efficiency (GEG), ESG/CSRD. Companies must offer and document training, and employees must participate.

Prioritisation of Training Topics

Do you know of existing trainings that already address, fully or partially, the identified skills gaps, and what urgent skills are required across the construction sector as a whole, as well as emerging skills not yet covered but relevant to these ten occupations?

- Sustainability with BIM (bim STANDARD, IFBau)
- BIM certifications (AGT Academy)
- VDI Forum (sustainability, digitalisation)

Cross-cutting competencies: BIM, ESG, project management.

Emerging skills: AI in planning, cybersecurity, digital construction logistics, circular design

Training Delivery and Innovation

How could cVET in the construction sector be improved in your country in terms of duration, frequency, and format (in-person, remote, hybrid), what innovative methods or best practices could enhance its delivery?

Potential for improvement: hybrid formats, microlearning, mobile learning solutions, more frequent training.

Innovations: gamification, VR, AI-supported learning paths, micro credentials.

6.4. Greece

Greece

Skills Shortages and Urgent Training Needs identified by experts

Which occupations require the most urgent skills, what are the most pressing green, digital, entrepreneurial, and soft skills identified, and how do these differ between white- and blue-collar jobs?

- Construction related professions (i.e bricklayers, builders & machine operators)
- Green building materials and BIM for green and digital skills. Moreover, communication skills are important

When comparing white-collar and blue-collar roles, the emphasis and depth of these skill sets differ in some levels. Blue-collar workers on the first place have a need to translate green and digital knowledge into practical on-site actions, such as implementing sustainable materials and make use of digital tools relevant to their tasks. They prioritize hands-on implementation and adaptability. White-collar professionals, such as engineers and project managers, have a focus on strategic planning, project design for sustainability, regulatory compliance, and advanced digital project management. Their entrepreneurial skills lean towards resource planning, team leadership, and business development.

Trends in the Construction Sector and CVET

How is the construction labour market evolving in your country, in terms of workforce demand, job vacancies, and required skills, and are there any legal or regulatory requirements for cVET in the sector—and if so, what are the main obligations for companies and workers?

The construction labour market faces strong growth, especially in 2024, driven by increased building permits, large infrastructure investments, and significant funds from the EU Recovery and Resilience Facility. Employment growth is expected to continue steadily through 2030. However, challenges such as high construction material costs, high interest rates affecting investments, regulatory uncertainties, and skilled labor shortages remain. There is a growing demand for workers with green and digital skills, especially in energy efficiency and BIM (Building Information Modelling).

Law 5082/2024 focuses on the national vocational education and training system, aligning qualifications with the European Qualifications Framework and enhancing social inclusion, including access for people with disabilities. The Strategic Plan for VET and Lifelong Learning 2025–2027 emphasizes quality assurance, at least 50% work-based learning, alignment with labour market needs, and integration of digital and green skills, with supervisory bodies such as EOPPEP and Regional VET Councils overseeing implementation.

Companies and workers should engage in vocational training programs that are aligned to labour market needs, emphasizing green and digital skills development

Prioritisation of Training Topics

Do you know of existing trainings that already address, fully or partially, the identified skills gaps, and what urgent skills are required across the construction sector as a whole, as well as emerging skills not yet covered but relevant to these ten occupations?

- ET4Digital, focusing on digital innovation training for trainers in construction.
- BIM4D, which addresses BIM use in construction/deconstruction with a focus on green and digital skills.
- Green Circle, which develops micro-credentials for green construction skills.
- National programs run by DYPA provide vocational education and short upskilling courses in digital tools, energy efficiency, and safety.

- Regional KEDIVIM units offer certified adult education with blended and remote learning options, covering renewable energy and advanced construction technologies.
- Urgent skills include basic digital literacy especially for immigrant workers in construction in low levels of hierarchy as well as energy efficient building methods like insulation. Technical skills remain also vital across the technical professions.

No there are not any other emerging skills that are missing.

Training Delivery and Innovation

How could cVET in the construction sector be improved in your country in terms of duration, frequency, and format (in-person, remote, hybrid), what innovative methods or best practices could enhance its delivery?

- CVET can be integrated in specific training programmes that allow seasonal workers to be part of them. A hybrid format fits best to it, by accommodating their needs especially for workers in rural areas.
- Innovative methods may include mentorship programmes as well as Prior Learning Recognition. Moreover, the use of microcredentials may be useful.

6.5. Ireland

Skills Shortages and Urgent Training Needs identified by experts

Which occupations require the most urgent skills, what are the most pressing green, digital, entrepreneurial, and soft skills identified, and how do these differ between white- and blue-collar jobs?

In Ireland the findings of BUSI2020 (published March 2024) highlighted the need for urgent upskilling of the 160,000 existing construction labour force and an estimated additional 100,000 workers to meet both climate action and housing targets. Urgent skills and upskilling can be said to relate to engineers and energy officers and energy managers predominately.

Changes identified by experts include an increase in demand for green skills, such as decarbonization, circularity and digital skills such as Building Information Modelling, (mainly BIM REVIT), drones, Scan to BIM, and Green Procurement and WLC tools were highlighted by interviewees as urgent. The BIM mandate has pushed / will continue to push the industry to upskill in this area at all levels but predominantly professionals such as engineers, architects, quantity surveyors.

The renovation of residential buildings and the energy renovation of historic and traditional builds (pre 1940s) are also requiring specific skills and new guidelines have been issued by Government bodies and the Office of Public Works (OPW). Consequently, there are many Job vacancies for the above and for management in these areas, as circularity and decarbonization is a newer skillset, different management skills are required.

Carpenters and joiners, bricklayers and insulation workers need to be aware of energy efficiency, ventilation, air tightness, circularity and decarbonisation through practical hands-on skills and on-site short trainings. Modern Methods of Construction (MMC) and transversal skills such as communications and leadership are vital as tasks such as advising professions (architects, managers, owners e.g.) are vital. Areas of expertise of trades such impact of materials and positioning etc cannot be lost.

Ireland

Trends in the Construction Sector and CVET

How is the construction labour market evolving in your country, in terms of workforce demand, job vacancies, and required skills, and are there any legal or regulatory requirements for cVET in the sector—and if so, what are the main obligations for companies and workers?

Most employment in the construction sector had some level of green intensity, with only 6% having zero green skills associated with it; at 56%, this sector had the highest share with a 5%-9% level of green intensity.

The BIM Mandate in place from January 2024 for the larger new projects, will soon be mandated for all new build projects by December 2028. So, all projects will need to be BIM orientated affecting tendering and work-based practices for all companies large and SMEs.

The International Cost Management Standards (ICMS) cost and carbon reporting templates are mandated for use from the 1st of January 2024

Introduction of Whole Life Carbon Assessment (WLCA) and Decarbonisation are the main topics dictated by the Energy Performance of Building Directive and the Energy Efficiency Directive and these are being implemented in Ireland

Prioritisation of Training Topics

Do you know of existing trainings that already address, fully or partially, the identified skills gaps, and what urgent skills are required across the construction sector as a whole, as well as emerging skills not yet covered but relevant to these ten occupations?

The Department of Further and Higher Education, Research, Innovation and Science has launched the Modern Methods of Construction Action Plan. The eight themes cover a range of areas including senior management training, information sharing, new roles and labour retention, use of digital and AI tools, certification, early learning engagement, policy levers, and training provision.

The VET Centres of Excellence known as NZEB CoE, provide upskilling and training programmes for new builds to NZEB and ZEB standards and also in retrofitting with a growing suite of programmes relating to Modern Methods of Construction (MMC). DASBE has been one of the forerunners of addressing skills gaps and needs. The main programmes developed include major awards, with embedded shorter certificates.

- Programmes – DASBE | Ireland
- Postgrad Diploma/Masters in Decarbonisation in the built environment NFQ Level 9
- Postgraduate Certificate in Building Information Modelling (BIM) and Digital Leadership
- Higher Diploma in residential energy retrofit management NFQ Level 8
- Higher Diploma in energy renovation of traditional buildings NFQ Level 8
- Higher Diploma in Construction Data Capture and Analytics NFQ Level 8
- Certificate in Drones for Construction
- Certificate in Green Procurement in Construction and also micro-credentials.
- [Micro-credentials – DASBE | Ireland](#)
- Micro Credential in ICMS and BIM (for Quantity Surveyors)
- Micro Credential in ICMS and Whole Life Carbon Assessment

Urgent skills include upskilling in BIM, but there are several trainings available to accommodate most levels of expertise.

The difficulty is in getting staff and workers to upskill and train.

Training Delivery and Innovation

How could cVET in the construction sector be improved in your country in terms of duration, frequency, and format (in-person, remote, hybrid), what innovative methods or best practices could enhance its delivery?

As outlined in the [Green Skills 2030 strategy](#), stakeholders in the construction and built environment sector reflected on changing construction methods and approaches to reducing the environmental impact of the sector. This includes modern methods of construction (MMC), building information modelling (BIM), as well as traditional construction techniques.

In addition, embedding circularity and the circular economy in construction was recognised as a growing area to reduce the sector's environmental footprint. There is a key need for skills to meet Ireland's retrofitting targets, including plumbers, heating engineers, electricians, carpenters, plasterers, roofers, glaziers, insulation operatives, and airtightness operatives.

Stakeholders reported specific skills gaps in construction methods, with a particular emphasis on retrofitting skills, traditional building, and conservation skills, as well as environmentally focused skills such as carbon accounting, nature-based solutions, and biodiversity. For traditionally constructed buildings, there is a critical need for skills to allow for the reuse and adaptation of the existing building stock.

6.6. Italy

Skills Shortages and Urgent Training Needs identified by experts

Which occupations require the most urgent skills, what are the most pressing green, digital, entrepreneurial, and soft skills identified, and how do these differ between white- and blue-collar jobs?

In the construction sector in Italy, the most urgent skills shortages concern skilled workers, site technicians, site managers, BIM designers, safety coordinators and technical managers. These figures need to update rapidly to meet the growing demand for green (CAM, green building, energy efficiency), digital (BIM, sensors, drones, artificial intelligence), entrepreneurial (ESG management, digital leadership) and transversal (teamwork, communication, problem solving) skills.

Needs between blue-collar and technical workers change: white-collar workers (designers, managers) focus on digital and regulatory management, while blue-collar workers and foremen need to develop new practical and digital basic skills. However, the green and digital transition involves all job profiles, making continuous training a common and cross-cutting urgency.

Trends in the Construction Sector and CVET

How is the construction labour market evolving in your country, in terms of workforce demand, job vacancies, and required skills, and are there any legal or regulatory requirements for cVET in the sector—and if so, what are the main obligations for companies and workers?

The labour market in the construction sector in Italy is undergoing a major transformation, driven by public incentives such as the Superbonus 110% and the Piano Nazionale di Ripresa e Resilienza (PNRR). This has led to a significant increase in labour demand, but also to a clear gap between demand and supply of qualified skills. Companies are struggling to find skilled workers, especially in sustainability, digitization and security. The skills required are changing rapidly, affecting both operational and technical roles.

At the regulatory level, continuous training is increasingly regulated: in particular, the ACSR (State-regions agreement) of 17 April 2025 introduces updated obligations on safety training. Companies must ensure up-to-date training for workers, while workers themselves must be up to date with the required updates, especially in areas such as CAM, digitization and risk management.

Italy

Prioritisation of Training Topics

Do you know of existing trainings that already address, fully or partially, the identified skills gaps, and what urgent skills are required across the construction sector as a whole, as well as emerging skills not yet covered but relevant to these ten occupations?

In Italy, there are already active training courses that address, at least in part, the skills gaps in the construction sector. Construction schools offer courses also on BIM, CAM, advanced safety and even innovative projects integrating artificial intelligence into design. However, there remain urgent skills to be deployed on a large scale, across multiple occupations: construction site digitisation, energy efficiency, environmental sustainability and operational soft skills.

Emerging skills not yet covered include the use of AI on construction sites, cybersecurity for digitised facilities, data management (from sensors, drones, BIM), ESG approach in procurement and digital leadership. These skills, which are still underrepresented in CVET pathways today, are crucial to prepare all 10 priority professions for the changes taking place in the sector.

As far as management figures are concerned, it is important to develop in-depth knowledge of industry regulations.

Training Delivery and Innovation

How could cVET in the construction sector be improved in your country in terms of duration, frequency, and format (in-person, remote, hybrid), what innovative methods or best practices could enhance its delivery?

To improve continuing education and training (CVET) in the construction sector in Italy, it is crucial to adopt a flexible, modular and hybrid model, combining in-presence training for practical skills and online classes for the theoretical parts. Basic courses of at least 100 hours with a strong practical component, supplemented by biannual updates of 16 hours, are recommended. Timetables should be adaptable, including evenings or weekends, to facilitate the participation of employed workers. It is important that continuous training is not a mere repetition of what has already been learnt but an effective process of updating workers' specific skills.

Good practices and innovative methods include: microlearning, augmented reality, virtual simulations, on-the-job training, and the BBS (Behavior-Based Safety) method already tested in collaboration with INAIL in the "SicuraMente" project

6.7. Luxembourg

Luxembourg

Skills Shortages and Urgent Training Needs identified by experts

Which occupations require the most urgent skills, what are the most pressing green, digital, entrepreneurial, and soft skills identified, and how do these differ between white- and blue-collar jobs?

Blue-Collar occupations with the most urgent skills needs:

- **Construction workers (general):** skills needed in airtightness, insulation, deconstruction, use of new materials, bio-sourced materials, and healthy building practices.
- **Crane and machine operators:** require ongoing safety training and use of simulators.
- **Installers and energy systems technicians:** gaps in renewable energy system installation (hydrogen, geothermal, solar), energy storage, and temperature control systems.
- **Renovation and insulation specialists:** renovation with new ecological standards (airtightness, interior/exterior insulation) is a major need.

White-Collar occupations:

- **Architects and engineers:** need more advanced training in healthy building design, thermal bridge simulation, and coordination between trades.
- **Project managers and site supervisors:** require skills in digital coordination (e.g. BIM), real-time modelling, and communication among stakeholders.

Most urgent skills by category**Green skills** (the most frequently mentioned):

- **Design and execution of healthy buildings** (air quality, airtightness, insulation).
- **Use of bio-sourced and environmentally friendly materials.**
- **Building deconstruction and material reuse** for circular economy strategies.
- **Integration of renewable energies:** solar, wind (district turbines), geothermal, hydrogen.
- **Maintenance of sustainable systems:** skills to service new low-carbon technologies.

Digital skills:

- **3D modelling** and digital construction (e.g., BIM) to enable real-time collaboration across design and execution phases.
- **Virtual reality (VR)** training simulations for safety, construction detailing, and energy-related diagnostics.
- **AI-assisted learning** and process optimization.
- **Digital communication and coordination tools** to improve workflow across trades.

Entrepreneurial skills:

- **Business setup knowledge** (e.g., “brevet de maîtrise” that is needed to open a construction business in Luxembourg).
- **Understanding of regulatory frameworks**, especially around energy performance and sustainability.
- **Innovation management:** adapting to fast-paced changes in techniques and materials.

Soft skills:

- **Interdisciplinary coordination** and **team communication** across multiple trades and levels of qualification.
- **Continuous learning mindset:** especially among middle and upper management, where training is currently lacking.
- **Adaptability and problem-solving** in response to decarbonization and material scarcity.

Trends in the Construction Sector and CVET

How is the construction labour market evolving in your country, in terms of workforce demand, job vacancies, and required skills, and are there any legal or regulatory requirements for cVET in the sector—and if so, what are the main obligations for companies and workers?

- Labour shortages and skill gaps. A loss of experienced workers due to retirement and a lack of young skilled replacements are major concerns.
- Increased technical complexity. The sector is evolving toward more technically demanding roles, especially with the integration of sustainability and energy performance standards.
- Need for innovation-driven upskilling. New construction methods like 3D printing, prefabrication, and bio sourced materials are emerging, requiring specific training.
- Traditional labour sources are dwindling, requiring either new labour pools or increased automation.

CVET Regulatory Requirements:

- Legal obligations apply in areas like airtightness, electricity, fire safety, and acoustics; updates are frequent due to evolving legislation.
- For certain professions (architects, engineers, machine operators, etc.), mandatory certifications and registration with professional bodies are required.
- In Luxembourg, a sectoral framework links training to both professional and salary development, especially in health and safety.
- Safety and health regulations are of a high standard.

Prioritisation of Training Topics

Do you know of existing trainings that already address, fully or partially, the identified skills gaps, and what urgent skills are required across the construction sector as a whole, as well as emerging skills not yet covered but relevant to these ten occupations?

Urgent cross-sectoral skills needed:

- **Air quality and healthy buildings.** Needed across roles, both in design and execution stages.
- **Decarbonization and renewable energy.** This includes hydrogen, geothermal, and solar integration.
- **Digitalization.** Mostly important for 3D modelling and real-time coordination during design and execution.
- **Building renovation skills.** These skills will mainly include airtightness, insulation, and use of bio-sourced materials.
- **Dismantling and reuse.** Competence in deconstruction and materials reuse is vital for circular construction. In Luxembourg a lot of initiatives are already in motion in this field but with a lack of the necessary skills.

Emerging skills not yet fully covered:

- **Prefabricated systems** and new materials (e.g., district wind turbines, energy storage systems).
- Enhanced **communication and coordination skills** among construction trades.

Existing training initiatives:

- IFSB and COCERT offer training in airtightness, sustainable construction, and more.
- EU-funded projects like **TRENOVERG** and **CRCO2C** support training in building renovation and sustainability

Training Delivery and Innovation

How could cVET in the construction sector be improved in your country in terms of duration, frequency, and format (in-person, remote, hybrid), what innovative methods or best practices could enhance its delivery?

Proposed Improvements to cVET:

- More frequent, shorter training formats are recommended over long sessions to maintain engagement and ensure continuous updates.
- Emphasis on practical application for intellectual roles (engineers, consultants), not just theoretical content.
- Suggestion to mandate regular training for managers and executives, not just workers.

Innovative methods and best practices:

- Virtual reality (VR) and simulators. Useful for safety, energy-saving, and realism in training.
- E-learning and hybrid formats. These solutions are Flexible self-paced learning followed by in-person sessions.
- AI and tutorials: Use of artificial intelligence and real-world demonstration videos to supplement learning.

6.8. Romania

Romania

Skills Shortages and Urgent Training Needs identified by experts

Which occupations require the most urgent skills, what are the most pressing green, digital, entrepreneurial, and soft skills identified, and how do these differ between white- and blue-collar jobs?

The most urgent shortages were identified in these occupations: construction electricians, HVAC installers, plumbers, carpenters, site engineers, and technicians. Additional gaps were noted for BIM specialists, energy auditors, and workers familiar with renewable energy installations.

Almost all respondents highlight that even core trades (bricklayers, masons, insulators) now require additional skills related to green construction and digital workflows. For example, HVAC technicians must understand smart system commissioning, and electricians should be able to integrate PV systems and manage energy storage device. A few stakeholders mention that new positions, like Energy Officers or Digital Project Managers, are emerging due to EU renovation policies and smart infrastructure needs. There are some urgent skills across all occupations:

Digital skills:

- Use of digital tools such as BIM, CAD, AR/VR platforms
- Basic IT and tablet literacy

Green skills:

- Circular construction and waste sorting
- Energy efficiency and green building practices (e.g., airtightness, insulation, nZEB compliance)

Transversal skills:

- Health & safety protocols (especially for high-risk energy systems)
- Communication and teamwork (especially in multicultural, multi-trade teams)
- Language skills (Romanian and English), particularly for foreign workers

Trends in the Construction Sector and CVET

How is the construction labour market evolving in your country, in terms of workforce demand, job vacancies, and required skills, and are there any legal or regulatory requirements for cVET in the sector—and if so, what are the main obligations for companies and workers?

There is high demand for electricians, HVAC technicians, plumbers, masons, carpenters, and site supervisors, thermal insulation workers. The shortage is driven by both internal and external factors: emigration of skilled workers, ageing workforce and limited interest among younger generations in vocational careers.

There is also a clear shift in the skills needed. Employers and educators agree that energy efficiency, digital competence (especially BIM), green building techniques, and circular economy knowledge are becoming essential across many roles. The TEC Cluster and UTCB refer to the national roadmap calling for over 160,000 new qualified workers by 2030 in energy renovation-related occupations. Despite growing job vacancies, employers face challenges in filling positions, especially those linked to EU-funded sustainable construction projects. A growing reliance on foreign labor (e.g., Sri Lankan workers) has been noticed, and salaries have increased in the sector to attract and retain talent.

Romania has a legal framework mandating cVET in certain conditions. Laws such as Law 279/2005, OG 129/2000, and GD 1425/2006 require employers with over 21 employees to develop annual training plans, consult workers, and provide mandatory training (e.g., health and safety) at least once every 2 years. Companies with fewer than 21 employees must offer training at least once every 3 years. Companies bear all training costs and must document participation. Additionally, companies with more than 20 employees must draft an annual professional training plan, in consultation with unions or employee representatives, and annex it to the collective labor agreement.

Romania

Employees, in turn, have both the right and duty to participate in professional training. The right is explicitly guaranteed by Article 39(1)(g) of the Labour Code, which entitles employees to employer-funded training. If training is initiated and paid by the employer, employees cannot resign for a specific period post-training, as defined in a contract addendum. Otherwise, they may be liable to repay training costs proportionally to the unserved time. For workers, participation in training—particularly related to OSH and regulated occupations—is mandatory. In specialized fields (e.g., potable water systems, energy systems), new regulations introduced in 2025 (Joint Ministerial Order 140/226/467/3549/2025) now require cVET programs with specific modules (e.g., hygienic risks, contamination prevention and proper material handling). While the law enables cVET, its enforcement is uneven. Many companies still offer only theoretical training with limited practical exposure

Prioritisation of Training Topics

Do you know of existing trainings that already address, fully or partially, the identified skills gaps, and what urgent skills are required across the construction sector as a whole, as well as emerging skills not yet covered but relevant to these ten occupations?

A wide range of EU and national programs address parts of the identified gaps:

- BUILD UP Skills Romania I & II: Developed qualification schemes for HVAC, insulation, RES systems
- STACCATO: Offers VR-based training for energy renovation
- nZEB Roadshow: Mobile training and awareness for airtightness, building envelopes
- AEC EUROCLUSTER: Digital and green transition training for SMEs
- TRAIN4SUSTAIN: Recognition of sustainable energy skills
- POWERING SMEs: Green transition training for SME leaders

Local universities (e.g., UTCB, Politehnica Timișoara) and organizations like Pro-nZEB, TEC Cluster, and CSC also run programs. However, stakeholders note the lack of ANC-recognized, up-to-date courses for adult workers.

Emerging skills:

Digital skills:

- Smart commissioning and predictive maintenance (HVAC, electrical)
- Digital site coordination using mobile platforms and dashboards (site managers)
- Augmented reality for inspections and training (site supervisors)

Green skills:

- Lifecycle and embodied carbon tracking (BIM managers, engineers)
- Modular and prefabricated construction assembly (bricklayers, prefab installers)
- Greywater and rainwater harvesting (plumbers)
- Smart fenestration (window and door fitters)
- Vehicle-to-grid (V2G) integration and EV-ready infrastructure (electricians)

Training Delivery and Innovation

How could cVET in the construction sector be improved in your country in terms of duration, frequency, and format (in-person, remote, hybrid), what innovative methods or best practices could enhance its delivery?

All interviewees recommend: Shorter, modular microlearning units (1–3 days)

- Frequent updates aligned with new technologies (quarterly or seasonal)
- Hybrid delivery models: online theory, on-site hands-on practice
- Mobile training units for rural access
- Multilingual content (Romanian + English)
- Integration with work schedules and flexibility for informal workers

Some suggest using PNRR and ESF+ funds to build national e-learning platforms and to support digital credentialing.

On the other hand, according to the innovative methods, experts have mentioned the following ones:

- VR/AR simulations for hands-on learning
- BIM-based digital exercises and clash detection labs
- Gamification platforms (e.g., EnergySkills+, BIMPlay)
- Peer mentoring on-site
- Digital logbooks and renovation passports
- IoT-enabled demo kits for HVAC and RES systems
- Training of Trainers (ToT) programs
- Inclusive design (language, gender, age-sensitive tools)

6.9. Slovenia

Skills Shortages and Urgent Training Needs identified by experts

Which occupations require the most urgent skills, what are the most pressing green, digital, entrepreneurial, and soft skills identified, and how do these differ between white- and blue-collar jobs?

The Slovenian construction sector faces acute shortages in several occupations. Urgent needs are identified among heavy equipment operators, construction logistics coordinators, recycling and materials handling workers, and technical sales consultants for sustainable products. Shortages are also significant among cultural heritage restoration specialists and planning engineers (architects, civil, and MEP engineers). Low project fees compared to EU benchmarks limit investments in workforce skills and technology.

- Green skills required include circular economy practices, bio-based materials, CO₂ tracking, and knowledge of green public procurement.
- Digital skills cover BIM viewers, CO₂ dashboards, AI predictive maintenance, and digital logistics platforms.
- Entrepreneurial skills are needed for innovative project management, tendering, and integration of ESG criteria.
- Soft skills include communication with clients, teamwork across sectors, and adaptability to green and digital change.

Differences by occupation level:

- Blue-collar workers need hands-on green and digital competencies (waste handling, device operation, basic IT security).
- White-collar staff need advanced skills in digitalisation (BIM, AI, IoT), ESG documentation, ERP-based project management, and cross-sector collaboration.

Trends in the Construction Sector and CVET

How is the construction labour market evolving in your country, in terms of workforce demand, job vacancies, and required skills, and are there any legal or regulatory requirements for cVET in the sector—and if so, what are the main obligations for companies and workers?

Despite record state investment, Slovenia's construction output is declining (–9% in 2024, –8% in early 2025). Public procurement accounts for 80% of construction activity, yet contracts do not reward innovation, ESG compliance, or workforce training.

Dynamics on the labour market:

- Persistent shortages of operational labour and designers.
- Project design fees remain unsustainably low, limiting R&D and digitalisation.
- Larger firms spend €5,000–7,000 annually per employee on training and tools, but without proportional returns

Legal and regulatory requirements for continuing professional development

- No mandatory CPD for workers at EQF 3–6 (the majority of the workforce).
- Annual CPD is required only for EQF 7–8 professionals (architects, engineers).
- No sectoral social funds exist to co-finance training, unlike in other EU regions, leaving SMEs and lower-skilled workers underserved.

Prioritisation of Training Topics

Do you know of existing trainings that already address, fully or partially, the identified skills gaps, and what urgent skills are required across the construction sector as a whole, as well as emerging skills not yet covered but relevant to these ten occupations?

Several institutions provide training (Chamber of Architecture and Planning – ZAPS; Chamber of Engineers – IZS; Association for Concrete – ZBS; Craft chamber – OZS; Association for Asphalt – ZAS; GZS CPU Training Centre and private companies), but most courses are short, classroom-based, and theoretical, with limited workplace integration. However, most of these programmes are one-day, theory-oriented sessions with limited practical application. They rarely deal directly with real-life conditions on the construction site, digital workflows or ESG-compliant project management. The interviews with Slovenian experts consistently revealed skills gaps spanning several construction professions, including:

- **Circular economy and waste management** – practical skills to separate, document and reuse materials in quarries, in trade and on construction sites.
- **Digital logistics and remote site monitoring** – the ability to utilise digital dashboards, drones and real-time tracking tools to improve scheduling, safety and compliance.
- **Green public procurement and ESG documentation** – knowledge of how to tender, document compliance and demonstrate workforce competences in line with new EU directives (where there is currently no formal training).
- **Interoperability of software platforms** (ERP, BIM viewer, CO2 calculator) – currently handled on an ad hoc basis, with little structured training.
- **Soft skills for cross-sector collaboration** – especially in vertically integrated companies (quarrytrading site) where different operating units need to be coordinated to achieve project efficiency and sustainability goals.

There are critical new competencies needed to adapt the Slovenian construction workforce to EU and global trends that are currently not systematically addressed in training programmes:

- **AI-powered planning and predictive logistics** for equipment and material flows to reduce delays and energy consumption.
- Tracking the **carbon footprint** across the entire construction value chain (from raw material extraction to final building operation), including reporting according to the EU taxonomy.

- Training on **bio-based and circular materials** (hempcrete, recycled composites, low-carbon concrete) for both designers and construction workers.
- **ESG compliant** tendering and reporting – skills to create bids that go beyond the lowest price criterion and emphasise workforce skills and sustainability performance.

Digital safety training with micro-credits for machine operators, supervisors and site managers, recognised by contracting authorities and procurement bodies.

Training Delivery and Innovation

How could cVET in the construction sector be improved in your country in terms of duration, frequency, and format (in-person, remote, hybrid), what innovative methods or best practices could enhance its delivery?

The sector urgently requires institutionalised and mandatory cVET, especially for EQF 3–6 roles. Training is often seen as a cost, not an investment. Mandatory schemes could:

- Level the playing field among companies.
- Ensure access to training for all workers, including migrants.
- Align Slovenia with EU practices where social funds support cVET.

Challenges with Apprenticeship and Dual Training:

In 2017, Slovenia adopted the Apprenticeship Act (ZVaj). Slovenia reintroduced the apprenticeship system (dual VET) supported by the Ministry of Education, trade unions and promoted by GZS (Chamber of Commerce and Industry of Slovenia). The apprenticeship program was launched in schools as a pilot project in the 2017/18 school year with the aim of increasing employment opportunities for young people after they finish school and attracting students to programs in shortage occupations. The implementation of apprenticeships is monitored by the Center for Vocational Education (CPI), which evaluates apprenticeship programs and prepares annual reports on the implementation of apprenticeships at employers. This is an important mechanism that can help young people gain work experience while still in education. However, uptake has been extremely low in the construction sector. Interviews and sector reports point to several factors, as low awareness, administrative burden, limited mentors, and misalignment between school curricula and site needs.

Stakeholders agree there is significant room for improvement, particularly through:

- Better promotion and outreach, targeting both young people and companies.
- Streamlined administrative processes for companies to host apprentices.
- Closer integration of digital and green skill modules into the apprenticeship tracks to make them future-proof and more attractive.

Recommended measures for delivery and format:

- Hybrid models combining on-site practice with e-learning.
- Intensive modules scheduled in winter, when site activity slows.
- Introduction of micro-certificates integrated into the National Qualifications Framework to formalise targeted training in areas such as green procurement, digital security, and machine operation.

6.10. Spain

Spain

Skills Shortages and Urgent Training Needs identified by experts

Which occupations require the most urgent skills, what are the most pressing green, digital, entrepreneurial, and soft skills identified, and how do these differ between white- and blue-collar jobs?

The sector is facing an important transformation towards green construction while struggling with structural challenges. The 2009 crisis caused the loss of one million workers in the sector alone and halted the generational replacement of workers. The workforce today is rapidly ageing, and youth represent a winding 10% of the sector. Shortages of both skilled workers and middle managers reach across the country. A sizable amount of worker slack basic technical skills such as construction-applied mathematics and reading plans, while the demand for new skills is emerging. Industrialised and modular construction is gaining relevance, alongside digitalisation and green skills, driven by the progressive rollout of EU regulations and facilitated by EU Next Generation funds.

Overall, Spain will need to balance the existing urgent labour shortages together with the pressing needs deriving from the green and digital transitions.

Urgent technical skills across different construction trades:

- Placement and assembly of prefabricated concrete.
- Thermal and acoustic insulation of buildings.
- Waste management and selective demolition.
- Installation of natural material panels other than wood.
- Site monitoring and supervision.
- Modular construction.

The most urgent skills, common for construction trades include:

- Basic mathematical foundations/operations.
- Blueprint and construction drawings interpretation and technical requirements.
- Problem-solving.
- Circular economy/recycling

Trends in the Construction Sector and CVET

How is the construction labour market evolving in your country, in terms of workforce demand, job vacancies, and required skills, and are there any legal or regulatory requirements for cVET in the sector—and if so, what are the main obligations for companies and workers?

Construction faces a severe shortage of skilled labour partially due to its poor attractiveness, worsened by the reduced inflow of experienced migrant workers. The gap is most acute in middle-management roles. Demand is rising for specialists in thermal insulation, construction machinery operation, and site and team supervision.

The sector is shifting from new construction to the rehabilitation and adaptation of the existing building stock. Strategic priorities are sustainability, digitalisation, and industrialisation, driven by the fast-tracking of energy efficiency and climate adaptation, with emphasis on urban challenges such as heat islands and flooding.

In Spain, training in **Health and Safety** is an essential requirement to access any cVET course. The regulations and the General Collective Agreement for the Construction Sector establish that every worker must have preventive training appropriate to their position, whether through basic courses, trade-specific courses, or courses for intermediate management. Also, the new Vocational Training Law introduces indirect training requirements, and certain professions (e.g. electricity, gas, HVAC) require formal certification.

Prioritisation of Training Topics

Do you know of existing trainings that already address, fully or partially, the identified skills gaps, and what urgent skills are required across the construction sector as a whole, as well as emerging skills not yet covered but relevant to these ten occupations?

Courses from the Fundación Laboral de la Construcción (FLC) already address some of the urgent skills identified, including basic courses in mathematics and construction drawing reading/interpretation.

Common priority content across the sector:

- Sustainability and resource efficiency.
- On-site waste management. Occupational safety as a transversal foundation. Some stakeholders see it as indispensable for all profiles, others as already covered and not a priority.

Main emerging skills across the sector include:

- Industrialised and modular construction. Relevant for assembly workers, site foremen and production technicians.
- Robotics applied to construction (including 3D printing of concrete structures and controlled demolition). Relevant for automation technicians, specialised operators and site managers.
- Internet of Things (IoT). Relevant for home automation technicians, maintenance and facilities management.
- Drone use in surveying, inspection, monitoring and safety. Key for surveyors, site technicians and quality/safety managers.
- Image-based measurement and 3D scanning, closely linked to BIM training. Targeted at technical architects, planners and quality technicians.
- Programming of PLCs and control systems. Important for electricians, home automation specialists and industrial installation technicians.
- Advanced positioning and guidance systems (GPS, laser). Important for heavy machinery operators and setting-out technicians.
- Home automation and building automation. Essential for electricians, installers and maintenance technicians.
- Renewable energy applied to buildings. For installers, energy efficiency technicians and designers.
- Advanced materials assessment. Useful for labs, quality technicians and designers.
- Digital supervision and traceability of waste. Relevant for site foremen, environmental technicians and sustainability managers.
- BIM training content should cover 3D scanning, digital project management, integration with emerging construction technologies, and practical application tailored to SMEs.

Training Delivery and Innovation

How could cVET in the construction sector be improved in your country in terms of duration, frequency, and format (in-person, remote, hybrid), what innovative methods or best practices could enhance its delivery?

Training courses should be short and flexible compatible with working hours, including hybrid formats combining online theory with in-person practice, and modular blocks. SMEs should receive special focus due to limited access to trainings.

Effective models include dual training combining theory and practice, continuous lifelong training, and short courses for specific skills. Occupational Safety and Health can be taught online, while trades should remain in-person to ensure skill acquisition.

Innovative tools with high potential include simulators and virtual reality based on collaboration with machinery manufacturers, video-based microlearning, gamification, and social networks for knowledge sharing. Virtual assistants and video assessments can support and accredit practical skills remotely.

7. Main findings: most urgent skills

7.1. Findings from the Occupations and Skills Matrices

This section presents the most urgent skills identified across the selected occupations, following validation from the national experts. The list is compiled by selecting only those skills identified as “very urgent” by experts and partners in at least 5 of the 10 participating countries. This approach ensures that the skills presented here reflect a broad consensus across the EU and are indeed most urgent for the national contexts.

A. Skills identified as very urgent in blue-collar occupations

For **blue-collar occupational profiles**, the most urgent skills identified to complete the joint green and digital transition are concentrated on three types of skills: green skills, digital skills and transversal skills.

Green skills are strongly represented across in activities linked to energy efficiency and the integration of renewable energy. Building electricians and insulation workers play a pivotal role here, with tasks such as mounting photovoltaic panels, installing and maintaining smart devices, and

applying insulation techniques (both interior and exterior) to meet thermal performance standards. HVAC engineering technicians require up-to-date skills in installing and maintaining heat pump systems, while bricklayers are increasingly expected to integrate sustainable materials and prepare structures for photovoltaic integration.

Several **digital skills** have also been identified as very urgent for blue-collar workers, yet these are often embedded or linked to other green and transversal competencies. As an example, bricklayers, carpenters/joiners, and HVAC technicians must interpret 2D and 3D plans, use digital measurement tools, and apply project compliance checks supported by digital tools. This implies basic digital literacy to understand instruction and fulfil technical requirements. Carpenters and joiners for instance, also need CNC machine operation skills for precision manufacturing, reflecting the gradual industrialisation of construction processes.

Project efficiency, safety and technical compliance is a key transversal skill for several blue-collar occupations, if not all. Ensuring overall project compliance with deadlines, safety regulations, and technical parameters. At the same time, for occupations such as electricians, it is very urgent for them to learn to apply problem-solving skills in time-sensitive contexts. Health and safety awareness remains an urgent, cross-cutting requirement across all blue-collar roles.

Skill	Category	Sub-category
Sort waste and demolition materials	Green	Green & sustainable construction
Ensure compliance with environmental and safety legislation	Green	Green & sustainable construction
Installation of heating/cooling systems with air-to-air heat pumps through ducts	Green	Energy efficiency & renewable energy
Interpretation of 2D and 3D map	Transversal/Digital	Transversal skills /Digitalization & industrialization
Ensure overall compliance with construction project requirements, including deadlines, safety regulations, and technical parameters.	Transversal	Transversal skills
Create solutions to problems	Transversal	Transversal skills

Skill	Category	Sub-category
Mount photovoltaic panels	Green/Digital	Energy efficiency & renewable energy
Perform a test run and adjust voltage	Green/Digital	Energy efficiency & renewable energy
Install smart devices	Green/Digital	Energy efficiency & renewable energy
Apply insulation strips, which prevent air exchange between outdoors and indoors areas using insulating false ceilings and cladding.	Green	Energy efficiency & renewable energy
Insulation and/or protection from the inside by means of insufflation, injection, spraying or blowing.	Green	Energy efficiency & renewable energy
Install insulation and/or protection from the outside (SATE) using insulating panels	Green	Energy efficiency & renewable energy

Note: each row corresponds to a single skill, with both the skill name and occupation originating from ESCO.

B. Skills identified as very urgent in white-collar occupations

A larger diversity of skills has been identified as very urgent for white-collar workers to be able to deliver the green and digital transition. **Green and transversal skills have been identified as most urgent.**

The **green skills** identified are mainly linked to planning, design and environmental regulatory compliance. For instance, designing sustainable building systems, promoting the use of green material and integrating circular economy principles are all skills identified as very urgent for civil engineers and architects.

There are several **transversal skills** identified as very urgent for white-collar profiles. Construction managers and site managers understandably require strong communication and coordination abilities with construction crews, as well as advanced site management skills. Civil engineering technicians on the other hand need to advise appropriately on building materials, inspect supplies, manage schedules and maintain records, while construction supervisors are expected to react to time-critical situations and coordinate multiple activities and teams. These profiles require a mix of technical and transversal skills involving planning, compliance monitoring, contract management and inspection activities, often supported, but not dependent of digital tools and skills.



Skill	Category	Sub-category
Communicate with construction crews	Transversal	Transversal skills
Monitor parameters' compliance in construction projects	Transversal	Transversal skills
Construction Site Management – oversee construction project, manage engineering project, set up temporary construction site infrastructure	Transversal	Transversal skills
Building and Material Advising – advise on building matters, advise on construction materials, inspect construction supplies, calculate needs for construction supplies	Transversal	Transversal skills
Prevent damage to utility infrastructure	Transversal	Transversal skills
React to events in time-critical environments	Transversal	Transversal skills
Design sustainable building systems – design passive energy measures, insulation concepts, building envelope systems, air tightness, and window/glazing systems	Green/Digital	Energy efficiency & renewable energy/Digital
Carry out and manage energy strategies for facilities	Green	Energy efficiency & renewable energy
Assess and analyse energy consumption and needs	Green/Digital	Energy efficiency & renewable energy /Digital
Conduct energy audits and prepare performance contracts	Green/Digital	Energy efficiency & renewable energy/Digital
Monitor activities and perform tasks ensuring compliance with standards involving environmental protection and sustainability and amend activities in the case of changes in environmental legislation. Ensure that the processes are compliant with environment regulations and best practices.	Green	Green & sustainable construction
Advise on environmental protection – communicate on environmental impact of mining, advise on building materials, pollution prevention, soil and water protection, environmental remediation, mining environmental issues, waste management	Green	Green & sustainable construction
Promote sustainability, environmental awareness, and use of green materials	Green	Green & sustainable construction
Assess resource life cycles and apply circular economy principles	Green	Green & sustainable construction
Ensure compliance with environmental legislation, including Restriction of Hazardous Substances (RoHS)/ Waste Electrical and Electronic Equipment (WEEE) regulations	Green	Green & sustainable construction
Advise on and determine appropriate heating and cooling systems	Green	Energy efficiency & renewable energy
Ensure compliance with legal requirements	Transversal	Transversal skills
Manage contracts	Transversal	Transversal skills
Oversee construction project	Transversal	Transversal skills
Perform and manage engineering projects	Transversal	Transversal skills

Skill	Category	Sub-category
Conduct site inspections and audits – conduct engineering site audits, inspect facility sites, inspect industrial equipment	Transversal	Transversal skills
Construction Planning and Scheduling – estimate duration of work, manage schedule of tasks, keep records of work progress, control of expenses, manage budgets	Transversal	Transversal skills
Coordinate construction activities	Transversal	Transversal skills
Ensure compliance, particularly with construction project deadline	Transversal	Transversal skills
Coordinate and inspect waste management procedures	Green	Green & sustainable construction

Note: each row corresponds to a single skill, with both the skill name and occupation originating from ESCO.

7.2. Additional insights from the Expert consultations

A. Common sector trends

Across the ten countries, experts highlight profound changes shaping the construction sector.

- The market is shifting **from new builds towards renovation, retrofitting and energy efficiency**, in line with EU climate targets and national sustainability policies.
- **Projects are becoming more complex**, driven by new regulations, advanced materials, and innovative construction methods such as prefabrication, modular systems, and 3D printing.
- These transformations are accompanied by **persistent labour shortages**, affecting both blue- and white-collar occupations, a challenge made more acute by retirements and the sector's limited appeal to younger generations. In this context, companies (and particularly SMEs) face a double burden: they **struggle to recruit and retain workers**, while at the same time finding it **difficult to release staff for training** without disrupting daily operations. This reinforces the need for training approaches that are flexible, modular, and work-based, allowing skills development to take place without worsening the labour gap.



B. Additional urgent skills identified by experts

The following urgent skills, not included in the Skills Matrix, were identified during the interviews.

Urgent Skill linked to blue-collar occupations	Country
Adequate reception, unloading and stocking to avoid selection errors and deterioration	Spain
BIM, Digital twin, AR/VR	Ireland
Competence in digitally supported logistics and equipment handling	Slovenia
Competence in digital-supported logistics and equipment handling (related to CPR+DPP and other environmental requirements)	Slovenia
Digitally supported logistics competence (drones, mobile data, AI-based site operation tools)	Slovenia
Digital-supported logistics competence (drones, mobile data, AI-based site operation tools)	Slovenia
Green roofs, circularity, renewables, use of biobased materials	Ireland
Install and maintain EV charging stations	Belgium
Install circular and bio-based construction materials (e.g., hempcrete, wood fibre panels)	Belgium
Know and understand environmental and waste management protocols	Spain
Knowledge of construction trends in sustainability, digitalization, and industrialization	Spain
MMC building methods, ventilation and air tightness	Ireland
Practical experience in identifying, separating, and documenting recyclable and circular materials on site	Slovenia
Recognize the properties of different insulation materials	Spain
Renewables, circularity in construction, energy community,	Ireland
The connection of the Energy Performance of Buildings (EPB) between the design (architects) and HVAC.	Belgium
Use Building Information Modelling (BIM) tools to interpret and execute construction tasks	Belgium
Use digital tools for energy efficiency assessment (e.g., thermal imaging, insulation performance diagnostics)	Belgium
Use of biobased materials, air tightness and ventilation	Ireland
Use of Building Automation Systems (BAS) and smart thermostats for HVAC control	Belgium

Urgent Skill linked to white-collar occupations	Country
AI-assisted resource planning (equipment, workforce)	Slovenia
Ensure compliance with national building codes, permits, and local regulations	Belgium
ESG procurement literacy and carbon documentation skills	Slovenia
ESG-compliant tendering and project reporting (linking bids to green and workforce criteria)	Slovenia
Knowledge of ESG-compliant public procurement and workforce competency criteria	Slovenia
Lifecycle cost optimisation skills (beyond basic budgeting)	Slovenia
Monitor and report on compliance with the EU Energy Efficiency Directive and national energy regulations	Belgium
Practical skills in circular economy material documentation and separation	Slovenia
Preparing ESG and carbon-tracking documentation	Slovenia
Skills for preparing ESG and carbon tracking documentation	Slovenia
Soft skills for stakeholder communication and adaptability	Slovenia
Support integration of Building Information Modelling (BIM) in technical documentation and site coordination	Belgium
Sustainability reporting, corporate strategy, environmental assessment	Ireland
Use Building Information Modeling (BIM) or ERP tools for project coordination and compliance tracking	Slovenia

C. Emerging Skills Needs

Experts were also asked to provide insights on emerging skills that are expected to gain relevance in **the medium to long term**. In the subsequent phase of the Construction Blueprint 2 project, particular attention will be devoted to these emerging skills, ensuring that the perspectives shared by the experts are duly taken into consideration.

The following emerging skills needs were mentioned by the experts:

- AI applications in planning, predictive maintenance, logistics, and training.
- Modular/prefabricated construction techniques.
- Smart commissioning of energy systems and integration of renewable technologies (solar, hydrogen, geothermal, EV-ready infrastructure).
- Advanced materials (hempcrete, low-carbon concrete, recycled composites).

- Digital twins, IoT integration, and robotics in construction processes.
- ESG reporting, carbon accounting, and compliance with EU taxonomy.

D. Common Recommendations on Training Responses

To respond to the challenges identified during the interviews, experts converge around similar training recommendations.

- **Flexible and hybrid formats:** Combination of in-person practical sessions with online theory, microlearning, and mobile training units, making training more accessible for SMEs, seasonal and migrant workers.
- **Short, modular, and frequent updates:** Regular (quarterly/annual) refreshers to keep pace with fast-changing technologies and regulations.
- **Innovative methods:** Use of VR/AR, simulators, gamification, AI-supported learning paths, digital logbooks, and micro-credentials.

- **Workplace-integrated training:** On-the-job training, apprenticeships, mentorship, and peer-to-peer models to ensure immediate applicability.
- **Inclusive and cross-sectoral approaches:** Training adapted to multicultural workforces, recognition of prior learning, and stronger links between education, VET providers, and industry.
- **Structured and mandatory CVET frameworks:** Several experts recommend adopting sector-wide obligations for continuous training, co-financed through social funds, to ensure fair competition and broad access.

7.3. Comparative analysis with the results from Construction Blueprint 1

The second Construction Blueprint builds on the findings of the first Blueprint, deepening the detail of skills and widening the scope of occupational profiles studied. The widening scope and detail of skills means the research methodology was adapted accordingly. Construction Blueprint 1 addressed skills gaps broadly through three areas of interest, namely energy efficiency, circular economy and digitalisation, relying on PESTLE analysis, national fact sheets, and gathered inputs from national advisory groups. It identified broad skills trends but did not systematically link them to occupations. By contrast, the second Construction Blueprint narrowed the urgent skills identified in ten priority blue- and white-collar profiles and applied a structured ESCO-based methodology with expert validation. The most important difference was the explicit inclusion of white-collar occupations —such as engineers, managers, supervisors, and energy officers—making the results address the training needs of the entire construction sector and not only onsite occupations.

A. Green skills

The adaptation of the research methodology had direct implications in the identification of urgent skills. Both research methodologies placed green competences as the main focus, but the level of detail was expanded in the later analysis, highlighting the need for training in a larger number of activities. In terms of green skills, the former identified NZEB standards, retrofitting, renewable energy, sustainable materials waste reduction and demolition recycling as broad areas of urgent intervention. The above-mentioned research translated these priorities into concrete and profile-specific requirements. For blue-collar profiles already analysed, the current analysis found urgent skills such as photovoltaic panel installation, advanced insulation techniques, smart energy devices and handling of modern heat pump systems still persists. The inclusion of white-collar occupations in the current analysis found additional urgent green skills, such as life-cycle assessments, integration of circular materials in new construction, carbon reporting and ESG-compliant procurement. At the same time, the former research emphasized practical waste management and demolition and skills as urgent. The current research highlights circular economy skills which are much more systemic and managerial in form. Skills such as bio-based circular material documentation, life-cycle assessments and ESG reporting are more closely tied to white-collar occupations, perhaps showing a shift in the approach to the circular economy beyond the occupations selected. This also does not necessarily imply that waste-related skills are no longer urgent, but perhaps that circularity skills are now integrated under sustainability skills tied to regulatory compliance and procurement.



B. Digital skills

Some similarities can be found in the evolution of digital skills. The former skills need analysis approached digitalisation around key technologies such as BIM, CAD/CAM, 3D printing, among others. The current analysis shifted the approach to ESCO-based skills definitions which were referenced to the prioritised occupations. Blue-collar occupations in the current research do have applied and validated skills such as using CAD in practice, operate drones for surveying, apply digital measurement tools and install domotic systems. These are more concrete digital skills applied to specific activities. Interestingly enough, 3D printing and cloud computing for instance did not appear in the current research, suggesting perhaps its lack of development as a market-ready technology. For white-collar professionals, BIM, management of digital-supported logistics and data-driven site monitoring works were deemed as urgent digital skills. This perhaps suggest a shift of urgent skills due to the more mature and immediate deployability of digital tools.

C. Transversal skills

The evolution of the urgent transversal skills also responds at least partially to the broadening scope of the skills analysed. In the former analysis, transversal skills were encapsulated in broader areas, emphasize skills such as collaboration teamwork and interdisciplinary work. In the current research, a broader definition of what transversal skills are was adopted. This way, skills such as entrepreneurial skills, contract management, decision-making under pressure and health and safety included in the analysis. Within this expanded definition of transversal skills, entrepreneurial and managerial skills as well as client relations and site supervision gained particular prominence. For the specific case of white-collar occupations, skills such as leadership, compliance and managerial capacities featured strongly.

In summary, the different research scope and research methodology means that a direct comparison of skills cannot be performed. Nonetheless, the broadening area of analysis in itself is a reflection of the evolution of the sector. This way, it can be concluded that there is an increasing number of green, digital and transversal skills that are becoming urgent and affecting a larger base of construction workers and trades.



Annex 2. Skills Matrices Assessed

Building electrician (ESCO: 7411.1.1 - EQF 1 - 4)
Define technical and part requirements
Determine and design appropriate heating and cooling systems
Design and operate solar thermal energy systems for hot water and heating
Perform a feasibility study on solar absorption cooling and solar heating
Create technical plans making use of technical drawing software
Perform a test run and adjust voltage
Advise architects
Apply technical communication skills
Assess environmental impact
Assess financial viability
Balance hydraulics of hot water systems
Build business relationships
Calculate solar panel orientation
Communicate with customers
Conduct performance tests
Create solutions to problems
Define energy profiles
Design a combined heat and power system
Design a domotic system in buildings
Design biomass installations
Design district heating and cooling energy systems
Design geothermal energy systems
Design heat pump installations
Design hot water systems
Install smart devices
Draft bill of materials
Draft design specifications
Ensure compliance with environmental and safety legislation

Building electrician (ESCO: 7411.1.1 - EQF 1 - 4)

Ensure equipment cooling
Evaluate integrated design of buildings
Examine engineering principles
Execute analytical mathematical calculations
Execute feasibility study
Follow company standards
Follow health and safety procedures in construction and working in heights and ensure safety in electrical power operations
Gather and use technical information
Identify fitted source for heat pumps
Inspect facility sites
Installation of circuit breakers, heating boilers and heating furnace
Design and install heating, ventilation, air conditioning and refrigeration ducts
Instruct on energy saving technologies
Integrate biogas energy in buildings
Interpret 2D and 3D plans
Make electrical calculations
Mount photovoltaic panels
Operate electronic measuring instruments
Perform feasibility studies on biogas energy; biomass systems; combined heat and power; district heating and cooling; electric heating and heat pumps and geothermal energy
Perform energy simulations
Read and prepare assembly drawings
Respond to electrical power contingencies
Select sustainable technologies in design
Use BIM models
Use CAD and CAM software
Use testing equipment
Use thermal analysis and management
Use personal protective equipment
Analyse, perform and record test data

Building electrician (ESCO: 7411.1.1 - EQF 1 - 4)

Identification of energy demand

Calculation and sizing of renewable generation systems and site control

Design after demand reduction and efficiency measures

Conduct and oversee quality control

Project management: coordinate and supervise engineering projects by managing workflows and supplies, monitoring progress, interpreting technical documentation, training staff, and addressing operational issues.

Insulation worker (ESCO: 7124.1 - EQF 1 - 4)

Advise architects

Apply insulation strips, which prevent air exchange between outdoors and indoors areas using insulating false ceilings and cladding.

Insulation and/or protection from the inside by means of insufflation, injection, spraying or blowing.

Install insulation and/or protection from the outside (SATE) using insulating panels

Assembly of ventilated facades

Apply the relevant health and safety procedures in construction to prevent accidents, pollution and other risks.

Coatings using insulating pastes and mortars.

Check construction compliance

Conduct fire safety inspections

Conduct land surveys

Inform on workplace safety standards

Inspect building systems

Manage construction archive

Manage health and safety standards

Monitor parameters' compliance in construction projects

Negotiate with stakeholders

Perform field research

Read standard blueprints

Review construction projects

Use safety equipment in construction

Write inspection reports

Bricklayers (ESCO: 7112.1 - EQF 1 - 4)

Advise architects

Audit contractors

Coordinate construction activities and marketing plan actions

Calculate need for construction supplies

Ensure overall compliance with construction project requirements, including deadlines, safety regulations, and technical parameters.

Identify customer objectives

Inspect construction supplies

Keep records of work progress

Manage contracts

Monitor construction site and contractor performance

Perform project management

Perform quality control of design during a run

Plan allocation of space

Plan shifts of employees

Read standard blueprints

Interpretation of 2D and 3D map

Sort waste and demolition materials

Modular construction: interpret plans and install connection of modular building elements

Prepare de envelope for PV walls

Recognize impact of materials lifetime for maintenance and demolition

Manage health and safety standards and follow procedures

Review construction projects

HVAC engineering technician (ESCO: 3115.1.5 - EQF 1 - 4)

Blast surface
Build scaffolding
Clean painting equipment
Dispose of waste (hazardous and non-hazardous)
Follow health and safety procedures in construction
Install construction profiles
Interpret 2D and 3D plans
Keep records of work progress
Maintain equipment
Maintain work area cleanliness
Operate rust proofing spray gun
Recognise signs of corrosion
Sand between coats
Set up temporary construction site infrastructure
Coordinate, oversee and advise the procurement and logistics of construction materials, from calculating needs to ordering, receiving, inspecting and transporting supplies.
Use measurement instruments
Use sander
Work in a construction team
Recognise types of heat pumps and their integration in the air-conditioning system.
Proper receiving, unloading and stocking of equipment
Correct installation and maintenance of all types of home automation systems
Installation of heating/cooling systems with heat pumps
Installation of heating/cooling systems with air-to-air heat pumps through ducts
Sealing of joints in duct passages (floor slabs, partitions, walls)
Preventive and/or corrective maintenance of heat pumps
Commissioning and testing of the installation
Key competences: system identification, design and selection, installation, testing and maintenance of heat pumps and arothermal systems.
Ensure compliance with environmental legislation
Installation of underfloor heating/cooling systems
Installation of heating/cooling systems with fan coils
Perform maintenance on installed heating/cooling systems with heat pumps

HVAC engineering technician (ESCO: 3115.1.5 - EQF 1 - 4)

Construction manager (ESCO: 1323.1 - EQF 6-7)

Advise on construction materials

Apply safety management

Calculate needs for construction supplies

Check construction compliance

Communicate with construction crews

Ensure compliance with legal requirements

Identify construction materials from blueprints

Identify customer's needs

Interpret technical requirements

Liaise with architects

Manage contracts

Oversee construction project

Plan construction of houses

Prepare construction documents

Review construction projects

Work in a construction team

Audit contractors

Carry out tendering

Communicate with customers

Consider building constraints in architectural designs

Design power plant systems

Ensure compliance with construction project deadline

Ensure compliance with environmental legislation

Follow nuclear plant safety precautions

Integrate building requirements in the architectural design

Integrate engineering principles in architectural design

Manage budgets

Manage construction archive

Manage environmental impact

Monitor contractor performance

HVAC engineering technician (ESCO: 3115.1.5 - EQF 1 - 4)

Monitor parameters' compliance in construction projects

Order construction supplies

Participate in governmental tenders

Review construction plans authorisations

Use current research results and collaborate with experts to optimise or develop concepts, equipment, and production processes which require a lesser amount of energy such as new insulation practices and materials.

Monitor activities and perform tasks ensuring compliance with standards involving environmental protection and sustainability, and amend activities in the case of changes in environmental legislation. Ensure that the processes are compliant with environment regulations and best practices.

Apply the relevant health and safety procedures in construction in order to prevent accidents, pollution and other risks.

Implement measures to minimise the biological, chemical and physical impacts of mining activity on the environment.

Building electrician (ESCO: 2142.1 - EQF 5-8)

Perform and manage engineering projects

Draw blueprints

Adjust and design engineering systems

Design and test engineering prototypes – design prototypes, test mechatronic units, test sensors

Assemble and install equipment – assemble mechatronic units, assemble sensors, install automation components, install mechatronic equipment

Operate and monitor equipment and systems – operate scientific measuring equipment, monitor electric generators, troubleshoot, resolve equipment malfunctions, operate printing machinery

Maintain and repair systems – maintain electrical equipment, robotic equipment, perform minor repairs, replace large components

Conduct site inspections and audits – conduct engineering site audits, inspect facility sites, inspect industrial equipment

Manage engineering and maintenance records – manage engineering projects, maintain records of maintenance interventions

Perform risk and scientific analysis

Use CAD and technical drawing software

Create and analyse maps with Geographic Information Systems (GIS) – apply digital mapping, compile GIS data, collect mapping data, collect data using GPS, create thematic maps, create GIS reports, create cadastral maps, use geographic information systems

Develop geological and environmental databases – develop geological databases, interpret scientific data to assess water quality

Manage scientific and research data – manage data, manage quantitative data, manage research data, manage open publications, manage FAIR (Findable, Accessible, Interoperable, Reusable) data

Use data analysis and mining tools – perform data mining, analyse big data, use specific data analysis software, use methods of logistical data analysis

Utilise machine learning

Operate open source and automation software – operate open source software, design automation components

Operate and develop digital models – process collected survey data, use software tools for site modelling, compare survey computations

Perform energy and transport simulations

Maintain and program smart systems (including irrigation controllers and thermal management systems)

Apply blended and digital learning methods

Promote sustainability, environmental awareness, and use of green materials

Building electrician (ESCO: 2142.1 - EQF 5-8)

Design sustainable building systems – design passive energy measures, insulation concepts, building envelope systems, air tightness, and window/glazing systems

Evaluate integrated design of buildings - Use goals and targets as means of measuring success of design proposals. Apply, combine and evaluate advanced methods for analysis of the interplay between energy systems, architectural concepts, building design, building use, outdoor climate and HVAC systems.

Assess resource life cycles and apply circular economy principles

Develop environmental and remediation strategies

Advise on environmental protection – communicate on environmental impact of mining, advise on building materials, pollution prevention, soil and water protection, environmental remediation, mining environmental issues, waste management

Perform and advise on environmental audits and assessments – assess environmental impact, carry out environmental audits, conduct environmental surveys, analyse environmental data, communicate on environmental impact of mining

Monitor and manage environmental quality – monitor air quality, radiation levels, water quality, manage environmental impact, manage water quality testing

Ensure compliance with environmental legislation, including Restriction of Hazardous Substances (RoHS)/ Waste Electrical and Electronic Equipment (WEEE) regulations

Investigate and mitigate environmental risks – investigate contamination, mitigate environmental impact of pipeline projects

Perform selective demolition and assess reusability of materials

Design and manage renewable energy systems – design geothermal systems, wind turbines, wind farm collector systems, provide information on wind turbines, solar panels, geothermal pumps, research ocean energy projects, research locations for wind farms

Assess and analyse energy consumption and needs

Adapt and monitor energy distribution – adapt energy distribution schedules, monitor energy distribution procedures, manage energy demand response

Coordinate electricity generation

Develop and maintain water management systems – conserve water resources, develop water purification methods, perform water treatment procedures, use water disinfection equipment, develop irrigation strategies

Examine and analyse geochemical samples, determine characteristics of soil, rock, and mineral samples

Follow health and safety procedures in construction

Civil engineering technician (ESCO: 3112.1 - EQF 5-8)

Construction Planning and Scheduling – estimate duration of work, manage schedule of tasks, keep records of work progress, control of expenses, manage budgets

Construction Site Management – oversee construction project, manage engineering project, set up temporary construction site infrastructure

Field Research and Surveying – conduct land surveys, perform field research, use measurement instruments, operate drones in civil engineering

Building and Material Advising – advise on building matters, advise on construction materials, inspect construction supplies, calculate needs for construction supplies

Prevent damage to utility infrastructure

Engineering Design and Adjustment – design buildings, adjust engineering designs, approve engineering design, define technical requirements, design scale models

Project Compliance and Coordination – liaise with architects, ensure compliance with construction project deadline, monitor parameters' compliance in construction projects, obtain relevant licenses, assess financial viability

Work ergonomically, work in a construction team

Geographic Information Systems (GIS) Use and Management – apply digital mapping, collect mapping data, compile GIS-data, create GIS reports, create thematic maps, use geographic information systems

Statistical and Data Analysis – apply statistical analysis techniques, perform data analysis, compare survey computations

Collect data using GPS and process collected data

Use CAD and technical drawing software

Deliver visual presentation of data

ICT and Software Use – use ICT systems, file documents, use spreadsheets software

Energy Audit and Management – identify energy needs, analyse energy consumption, conduct energy audit, carry out energy management of facilities, prepare energy performance contracts.

Sustainable Energy Advising – advise on heating systems energy efficiency, advise on utility consumption, promote sustainable energy, collaborate on international energy projects

Feasibility Studies on Renewable Technologies – execute feasibility study on hydrogen, combined heat and power, district heating and cooling, electric heating, solar absorption cooling, smart grid

Environmental Education and Awareness – promote environmental awareness, educate on recycling regulations, train staff on waste management

Waste Management Strategy and Regulation – advise on waste management procedures, coordinate waste management procedures, inspect recycling procedures, assess waste type, identify new recycling opportunities

Green Technology Information and Consulting – provide information on geothermal heat pumps, hydrogen, solar panels, wind turbines

Energy Policy and Concept Development – develop energy policy, develop energy saving concepts, determine appropriate heating and cooling system

Environmental Compliance and Control – ensure compliance with environmental legislation, follow procedures to control substances hazardous to health, assess environmental impact

Follow health and safety procedures in construction

Work in a construction team

Address problems critically

Assess environmental impact - Monitor environmental impacts and carry out assessments in order to identify and to reduce the organisation's environmental risks while taking costs into account

Energy management officer (ESCO: 3112.6- EQF 5-8)

Assess and analyse energy consumption and needs

Carry out and manage energy strategies for facilities

Conduct energy audits and prepare performance contracts

Advise on and determine appropriate heating and cooling systems

Perform feasibility studies on energy systems (district heating and cooling, combined heat and power, electric heating, solar absorption cooling, hydrogen, and smart grids)

Promote and develop sustainable and renewable energy solutions

Develop and implement energy policy and profiles

Teach and advise on energy principles and utility consumption

Develop energy saving concepts

Provide technical information on renewable technologies (geothermal heat pumps, hydrogen solutions, solar panels, and wind turbines).

Assess environmental impact

Ensure compliance with environmental legislation

Coordinate and inspect waste management procedures

Advise and train on recycling and waste management

Assess waste type

Promote environmental awareness and carbon footprint reduction

Use CAD and technical drawing software

Use ICT systems, spreadsheets, and office tools

File and manage digital documentation systems

Use Geographic Information Systems (GIS) (create GIS reports, compile GIS-data, create thematic maps, collect mapping data)

Apply Digital Mapping and Survey Techniques (collect data using GPS, compare survey computations, process collected survey data)

Perform Data Analysis (apply statistical analysis techniques, perform data analysis, deliver visual presentation of data)

Follow health and safety procedures in construction

Follow procedures to control substances hazardous to health (COSHH) such as bacteria, allergens, waste oil, paint or brake fluids that result in illness or injury

Construction General Supervisor (ESCO: 3123.1 - EQF 5-8)

Address the air tightness of the building as a part of energy conservation concept. Guide the design on air tightness towards the desired level of air tightness.

Advise on construction materials

Apply insulation strips, which prevent air exchange between outdoors and indoors areas.

Apply the relevant health and safety procedures in construction in order to prevent accidents, pollution and other risks

Be aware of the threats posed by potentially dangerous goods such as polluting, toxic, corrosive, or explosive materials.

Check compatibility of materials

Communicate with construction crews

Coordinate construction activities

Demolish a structure, or part of it, using selective demolition. Identify the different materials in the building and assess their reusability and value. Remove any reusable materials without damaging them.

Design spatial layout of outdoor areas

Dispose of dangerous materials such as chemical or radioactive substances according to environmental and to health and safety regulations.

Dispose of non-hazardous waste - Dispose of waste materials which pose no risk to health and safety in a manner which complies with recycling and waste management procedures.

Ensure compliance, particularly with construction project deadline

Evaluate integrated design of buildings

Execute feasibility study

Inspect construction supplies

Keep records of work progress

Liaise with architects, financiers, local authorities, shareholders and managers

Manage contracts

Monitor construction site

Monitor stock level

Negotiate supplier arrangements

Place solar water heaters, which use sunlight to heat water. Find a good location for the heaters, often on the roof of a structure, place them, and connect them to the water supply. Set up the water heater for use.

Plan allocation of space

Employees management: plan shifts, supervision, training, recruitment and evaluation

Prepare building site for construction

Process incoming construction supplies

React to events in time-critical environments

Set up the desired product design in the CNC controller of the CNC machine for product manufacturing.

Construction General Supervisor (ESCO: 3123.1 - EQF 5-8)

Use goals and targets as means of measuring success of design proposals. Apply, combine and evaluate advanced methods for analysis of the interplay between energy systems, architectural concepts, building design, building use, outdoor climate and HVAC systems.

Use GPS Systems

Work in a construction team

Annex 3. Experts interview Guidelines

Section 1 – Information on the Interviewee (name and surname; Country; Name and short description of the organization; position)

- Name and Surname
- Country
- Name and short description of organization
- Position

Section 2 – Trends in the Construction Sector and CVET in Your Country

- How is the construction labour market evolving in your country?
- Are there noticeable changes in workforce demand, job vacancies, or required skills?
- Are there any legal or regulatory requirements for cVET in the construction sector?

If yes, what are the main obligations for companies and workers?

Section 3 – Skills Shortages and Urgent Training Needs

Please provide your assessment of the most urgent skills shortages in your country across the 10 priority occupations identified by the Blueprint 2 consortium (partners from Belgium, Bulgaria, Germany, Greece, Ireland, Italy, Luxembourg, Romania, Slovenia, Spain).

Section 4 – Prioritization of Training Topics

- Do you know of existing trainings already addressing totally or partially the identified skills gaps? (Please provide as much information as possible: project names, organisations, contacts, etc.)
- Are there any urgent skills that you see as required across the construction sector (i.e. relevant to several occupations)? (please list and be as concrete as possible on the skills description and occupations).
- Are there any emerging skills that are not yet covered but are relevant to these 10 occupations? (please list and be as concrete as possible on the skills description and occupations).

Section 5 – Training Delivery and Innovation

- How could cVET in the construction sector be improved in your country, in terms of duration, frequency and format (in-person, remote, hybrid)?
- Are there any innovative methods or best practices that could enhance cVET delivery?
- Do you know of any cVET organization in your country that would be interested in testing or implementing the Blueprint 2 pilot training modules?

