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ACCELERATING VOCATIONAL EXCELLENCE IN THE CONSTRUCTION SECTOR

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PREFACE

Newton's Second Law of Motion (1687), $\rightarrow F = m \times \rightarrow a$, reveals that acceleration arises not just from the amount of force applied, but also from its direction.

The construction sector plays a key role in shaping the world around us, driving the development of cities, infrastructure and communities. With the global population expected to add 2.5 billion urban residents by 2050, billions of square meters of new buildings and entire cities are being developed annually. While ongoing urbanisation in regions like Asia and Africa contributes to this growth, a particularly significant construction effort is underway in Ukraine. Due to the ongoing war, the country has become one of the world's largest construction sites, with extensive rebuilding and infrastructure projects aimed at restoring cities and communities.

However, the environmental impact of the building and construction sector is undeniable, highlighting the urgent need for sustainable solutions to reduce its footprint. The sector is resource-intensive, consumes large amounts of energy, and has significant effects on biodiversity, making it both a challenge and an opportunity in the context of the green transition. As global population growth and urbanisation drive increasing demand for housing and infrastructure, the need to decarbonise the construction industry has become more pressing than ever. This transition is not just about achieving environmental goals; it is also a critical socio-economic priority, as emphasised by the Paris Agreement (UNEP, 2025).

Launched in March 2025, the Union of Skills is the European Commission's initiative aimed at enhancing Europe's human capital and competitiveness by addressing skills shortages and promoting lifelong learning, particularly in vocational education and training (VET) (European Commission, 2025). Centres of vocational excellence (CoVEs) are integral to this initiative, acting as networks that develop local or regional 'skills ecosystems' to provide high-quality vocational training. They are essential for modernising VET systems by bridging the gap between education and the labour market, ensuring that the workforce is ready for future challenges such as the green and digital transitions.

CoVEs have a key role to play in creating a sustainable and green construction sector, since future and current workers have to be provided with the skills, knowledge, and innovation capacity needed to address the sector's significant environmental challenges. Uniting training providers, employers, regional authorities, industry associations, research organisations and other possible partners, CoVEs can act as focal hubs for innovation, lifelong and adult learning, and skills development across the construction value chain – from material production to energy-efficient construction and waste management. They can serve as powerful catalysts, addressing the sector's green skills gap and enabling the implementation of advanced technologies, sustainable materials and energy-efficient practices.

The urgency of driving the green transition in construction is heightened by the need to attract new talent and develop educational programmes that are adaptable to emerging technologies and industry demands. These programmes must equip young learners with the knowledge and competencies required for implementing green innovations and practices. According to the International Labour Organization (ILO), the green transition could create up to 18 million additional jobs in construction by 2030. However, the sector faces a dual challenge: addressing an ageing workforce and replacing retiring workers, especially in countries where demographic shifts exacerbate these trends (CEDEFOP, 2023; ILO, 2024). This highlights the necessity to make construction careers more attractive and accessible, particularly to younger generations.

While significant efforts are being made to decarbonise the construction sector, progress remains slow and off-track to meet global climate objectives. Among the major barriers is a pronounced green skills gap, as the knowledge and competencies required to implement innovative technologies and sustainable solutions are lacking across the sector's value chain (BCG, 2023). VET systems, with their capacity to provide workers with the necessary qualifications, are critical to addressing this challenge. However, this requires a systemic transformation of VET. Training programmes must integrate green

skills and technologies; educators must be upskilled; and partnerships among VET providers, industry players and higher education institutions must be strengthened.

Against this background, bridging the green skills gap in construction is inseparable from achieving vocational excellence. CoVEs are ideally positioned to lead this transformation by leveraging their unique function as hubs of innovation and collaboration. They can champion forward-looking training that specialises in specific industrial clusters and is tailored to the needs of learners, industries and regions. By drawing on the collective resources of skills ecosystems – networks of partners working together to address skills needs – CoVEs can provide both technical and generic competencies that are essential for the green transition.

Furthermore, vocational excellence can help ensure a just and inclusive transition by addressing systemic barriers that often exclude underrepresented and marginalised groups from high-quality training and employment opportunities. By tailoring green skills training to the specific needs of these groups, such as by offering flexible schedules, accessible training locations and targeted support, CoVEs can create pathways for equitable participation in a greener construction sector. Additionally, targeted reskilling and upskilling initiatives for existing workers not only improve their job security, but also ensure that they remain competitive in a rapidly evolving sector, thereby fostering social equity and economic stability as the industry transitions to greener practices

The European Training Foundation (ETF) is at the forefront of supporting EU neighbouring countries in reforming their education and training systems to meet the demands of the green transition. Through the global ETF Network for Excellence (ENE), with more than 330 members from over 50 countries, the ETF facilitates partnerships, peer learning activities and the sharing of best practices to advance vocational excellence. ENE's global platform brings together a diverse range of VET stakeholders, including CoVEs committed to high-quality skills development. ENE's initiatives are designed to work both from the ground up and from the top down, fostering bottom-up initiatives that inspire innovation and action within institutions and communities. Building on these insights, ENE provides strategic policy advice, offering evidence-based recommendations that guide policy development and reform. This advice helps shape education and training systems to align with evolving labour market needs and drive systemic change in the VET sector.

GRETA (Greening Responses to Excellence through Thematic Actions) is ENE's flagship greening initiative. GRETA provides policy advice in supporting VET systems and CoVEs in accelerating vocational excellence through targeted, thematic actions, with a strong focus on greening. By help CoVEs respond to the challenges and opportunities of the green transition, GRETA empowers skills ecosystems to lead innovation, sustainability and inclusive growth.

In 2024 and 2025, GRETA activities have concentrated on the construction sector, highlighting both its challenges and its potential for transformation. By leveraging the expertise and experience of CoVEs, GRETA has provided valuable insights into sector greening and how vocational excellence can drive sustainable change.

This policy paper is part of GRETA's policy advice and peer learning activities. It explores the current state of the construction sector's green transition and examines how CoVEs can act as key agents of change. Drawing on lessons from the GRETA partnership, the paper outlines actionable policy recommendations to advance vocational excellence and green skills provision in construction. It is intended for policymakers, VET providers, industry leaders and social partners committed to strengthening VET systems and fostering a sustainable future.

We also acknowledge the contributions and insights shared by ENE members, international practitioners and organisations during GRETA's thematic online seminars on building green. We are grateful for the insights shared by the UN Environment Programme and the Global Alliance for Buildings and Construction. We recognise our strategic cooperation with UNESCO-UNEVOC, the Federal Institute for Vocational Education and Training (BIBB, Germany) and the Danube Strategy Platform. Finally, we extend our thanks to the European Vocational Training Association (EVTA), the European Forum of Technical and Vocational Education and Training (EfVET) and the European Association of Institutes for Vocational Training (EVBB).

The report was drafted by Susanne M. Nielsen, Lead Expert of GRETA at the ETF, along with Karsten Frøhlich and Andreas Lunkeit from the Danish Technological Institute.

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EXECUTIVE SUMMARY OF RECOMMENDATIONS

CoVEs represent a new approach to green skills development by acting as local innovation hubs that collaborate with partners to create training tailored to regional economic and social needs. They go beyond traditional training, driving reskilling and upskilling that support both green transitions and inclusive economic growth.

Accelerating vocational excellence requires a strong and flexible ecosystem supported by clear governance, strategic leadership, a culture of quality assurance, coordinated policies, and reliable funding. Together, these elements build the momentum needed to transform vocational education for sustainability.

Decarbonising the construction sector is crucial for addressing climate change due to its significant emissions and resource use. This shift demands the widespread adoption of green technologies and circular economy principles across the entire construction value chain. Equipping workers with green skills is essential not only for job creation, but also to ensure an inclusive and just transition.

The report proposes **11 recommendations** to accelerate vocational excellence and systemic green transformation in construction. Each recommendation is supported by important reflections to highlight its purpose and impact.

1. Grant CoVEs greater autonomy
   Giving CoVEs legal and managerial freedom allows them to innovate in green construction training and quickly respond to new skill demands. This autonomy supports strong partnerships with private-sector players, especially SMEs, and encourages local innovation while ensuring alignment with national policies. Balancing local flexibility and national oversight creates a resilient, effective training system.
2. Build inclusive skills ecosystems
   Skills ecosystems centred on CoVEs bring together governments, industry and communities to create shared responsibility for regional green development. These ecosystems adapt to diverse local economic conditions—from high-tech hubs to informal sectors—while promoting inclusive growth, reskilling opportunities and social equity, ensuring that no one is left behind during the green transition.
3. Expand work-based learning opportunities
   Practical, on-the-job learning is crucial for mastering green construction skills that classroom instruction alone cannot provide. Structured partnerships between CoVEs and companies enable diverse learning formats—from apprenticeships to simulations—making training accessible for both learners and small firms. Strong collaboration with industry keeps training relevant and up to date with technological advances.
4. Boost green career guidance and outreach
   Targeted outreach and career guidance initiatives increase the visibility and attractiveness of green construction careers. Engaging schools, employment services and industry ensures that outreach reaches underrepresented groups such as women and migrants, reshaping sectoral perceptions and building diverse talent pipelines through mentorship, site visits and hands-on experiences.
5. Revamp curricula for sustainability and digital skills
   Curricula must integrate sustainability and digital competencies (such as building information modelling (BIM) and circular economy principles) as core elements, not add-ons. Modular, flexible curricula co-developed with industry partners enable continuous updating to reflect emerging technologies and evolving labour market needs, fostering lifelong learning and adaptability.
6. Develop flexible upskilling and reskilling programmes
   Training programmes should be accessible to all adults—employed or unemployed—through modular formats that recognise prior learning and provide personalised pathways. Flexible delivery,

combined with support services such as childcare, enables marginalised groups to be included, ensuring that the workforce can keep pace with the growing demand for green and digital skills.

7. Invest in teachers' continuous professional development
   Continuous upskilling for teachers ensures that they remain knowledgeable about the latest green construction practices and effective teaching methods. Industry exposure, digital tools and modular training enable educators to deliver high-quality, innovative learning experiences. Supporting teachers' career development sustains the quality and relevance of vocational education.
8. Forge strategic research and innovation partnerships
   Partnerships between CoVEs and research institutions accelerate the integration of advanced sustainability innovations into training. Innovation hubs and living labs provide practical spaces for experimentation and knowledge transfer, helping SMEs engage in green R&D and aligning training with regional smart specialisation strategies.
9. Establish sustainable financing mechanisms
   Long-term, multi-source financing—including public funds, private partnerships, tax incentives and sector levies—is essential to sustain green vocational training. Linking funding to infrastructure development and workforce needs under national green strategies ensures stable resources and scalable impact.
10. Promote international quality frameworks and mobility
    Aligning qualifications with international standards and promoting learner and staff mobility enhance skills recognition, intercultural competence and institutional collaboration. These efforts enable CoVEs to serve as international platforms for shared innovation and inclusive green workforce development.
11. Adopt data-driven, outcome-oriented approaches
    Using clear metrics and continuous skills forecasting ensures that training programmes respond effectively to labour market and technological changes. Ongoing dialogue among education providers, industry and policymakers enables timely curriculum updates and innovation, supported by digital platforms and stakeholder forums that promote real-time collaboration.

1. INTRODUCTION

This thematic report presents a comprehensive approach to advancing vocational excellence in green construction by connecting bottom-up practice with top-down policy formulation. The report examines the construction sector's significant environmental impact and its critical role in the green transition, establishing the urgent need for skilled workers capable of implementing sustainable practices across the construction value chain.

The heart of the paper lies in its rich collection of practice examples – real-world initiatives that demonstrate how CoVEs and other stakeholders are addressing the green skills gap through innovative training approaches. These empirical cases span multiple dimensions of skills ecosystems, including certification pathways, practice-oriented training, teacher development, curriculum integration, public-private partnerships, research collaboration and green finance.

Drawing on these ground-level insights, the paper examines the strategic role of CoVEs as dynamic skills ecosystems – networks that connect education providers with industry, government and other stakeholders to drive innovation in vocational training. This systemic perspective provides the foundation for policy recommendations that translate practical lessons into strategic guidance for policymakers, education providers and industry leaders.

1.1. The climate crisis and construction

The climate crisis is among the greatest threats faced by humanity today. Rising temperatures have severe consequences, ranging from natural degradation and extreme weather events to risks for human health and socio-economic stability. The Climate Adaptation Report by the UN Environment Programme (UNEP) highlights that global average temperatures are rapidly nearing 1.5°C above pre-industrial levels, with current mitigation efforts falling far short of meeting the long-term temperature targets set by the Paris Agreement (UNEP, 2024b). To successfully mitigate the effects of climate change, we need to reduce carbon emissions and ensure more sustainable use of resources in line with the green transition, which ultimately means a shift towards net-zero emissions and a circular economy.

Because this transformation affects all economic activities and sectors, it requires fundamental adjustments to skills development. Education and training systems must be strengthened and better equipped to provide the workforce with the values, skills and qualifications needed to develop and implement innovative green solutions. Currently, labour demand for workers with green skills continues to outpace supply. Between 2022 and 2023, for instance, a global 12% increase in workers acquiring green skills was met by a rise of 22% in job postings requiring at least one green skill (WEF, 2025). This trend seems particularly concerning, as it is estimated that only one in eight workers globally possess one or more green skills (LinkedIn Economic Graph, 2023).

Since the shift towards sustainable economies will have varying impacts on workers, employers and communities, ensuring a just transition characterised by fairness, equity and inclusivity for all involved is crucial. For instance, many workers in high-carbon industries risk losing their employment while lacking the skills required for jobs in emerging green sectors. They and other affected stakeholders must not be left behind, but be given equal opportunities to contribute to and benefit from the green transition (GIZ, 2023a).

The European Training Foundation (ETF) supports human capital development in EU neighbouring countries by helping them reform their education and training systems in favour of social mobility and inclusion and alignment with labour market needs.

GRETA – Greening Responses to Excellence through Thematic Actions – is the ETF's initiative aimed at advancing vocational excellence for the green transition. It supports centres of vocational excellence (CoVEs) in adapting to the challenges and opportunities of the green transition through

partnerships, peer learning, and the exchange of practices within the scope of the global ETF Network for Excellence (ENE). Previous GRETA activities have examined approaches to greening various aspects of VET systems, including institutional strategies, curriculum development, teacher training, partnerships and funding mechanisms. More recently, GRETA has focused on the role of CoVEs in the greening of the construction sector by implementing open 'BUILDING GREEN' learning sessions for ENE members on relevant themes for skills delivery supporting a green transition in building and construction.

The construction sector is one of the most significant contributors to climate change, estimated to account for 21% of all global greenhouse gas (GHG) emissions. In 2024, the operation and construction of buildings accounted for 34% of worldwide energy demand and contributed to 34% of energy- and process-related global CO2 emissions (UNEP 2025; IEA, 2024) In addition, building and construction activities have a significant environmental footprint, including resource depletion, high water consumption, waste generation, local pollution and biodiversity loss.

In the EU alone, the construction sector accounts for 50% of all raw materials consumed annually and uses 1.8 billion tonnes each year (EEA, 2024). As of 2019, the share of secondary materials used in construction activities worldwide was approximately 9%, while global population growth and continuing urbanisation are fuelling the need for further floor space and supply infrastructure, thus increasing resource demand (UNEP, 2024c). Mining and quarrying for raw materials used in construction, such as cement and concrete, lead to significant biodiversity loss and land-use changes, which can also be the consequence of activities extending the built environment. A further environmental challenge is the pollution resulting from construction, renovation and demolition activities. They generate around 100 billion tonnes of waste globally each year and emit air pollutants, such as toxic dust from cement (UNEP, 2022; EEA, 2024).

Against this background, urgent action is needed to decarbonise the construction sector and support its shift towards circular resource consumption and sustainable practices, in terms of extending, renovating, demolishing and operating the built environment. The promotion of vocational excellence and high-quality skill provision for future and existing workers in construction must be an intrinsic part of such efforts. This is because these workers must be provided with the knowledge and values needed to act with greater resource and climate awareness, and need to be given the technical skills to implement innovative technologies and practices, such as the installation and operation of renewable energy solutions or intelligent building management systems.

As network organisations promoting vocational excellence, CoVEs are of key importance in this context. CoVEs typically consist of one or more VET providers collaborating with economic, educational, social and political partners. Together, they form local or regional 'skills ecosystems' with the aim of providing high-quality VET skills and strengthening regional development and growth. CoVEs are characterised by an extended scope of activities, high-quality performance, and the capacity to adapt and evolve to meet stakeholders' needs. They often play a leading role in the VET system, acting as models, coordinators or pathfinders for other VET providers (ETF, 2023a).

In the following subsection, this thematic report introduces recent international policy initiatives for building green. Section 2 examines technological advancements and discusses the need for green skills in the construction sector. Section 3 focuses on how CoVEs promote the green transition. Section 4 contains practice examples and insights originally shared during the four thematic online sessions on building green within the GRETA partnership. The final section, Section 5, builds on key insights from the preceding sections and provides policy recommendations for strengthening vocational excellence and the contribution of CoVEs in greening the construction sector.

1.2. International policy initiatives for a green construction sector

The greening of the construction sector presents a pressing challenge, as progress towards its decarbonisation is slow and off track to meet the 2050 target. For instance, while the sector's energy consumption continues to rise, only 7% of global energy consumption in buildings came from

renewable sources in 2022 (IEA, 2023; UNEP, 2024a). It is therefore evident that more decisive action is required – a view echoed by recent efforts at the international policy level[1].

Among the prominent examples are results from the two previous UN Climate Change Conferences (COP). COP28 marked the launch of Buildings Breakthrough, a platform for international collaboration on ensuring the prevalence of near-zero emissions and climate-resilient buildings by 2030 (GlobalABC, 2023). In the wake of this initiative, the first Buildings and Climate Global Forum was held in March 2024, bringing together high-level representatives, experts and other key stakeholders committed to greening the built environment. The forum concluded with the Declaration de Chaillot, a document adopted by representatives of 70 countries, aimed at boosting climate mitigation and adaptation in building construction and renovation (Buildings and Climate Global Forum, 2024; UNEP, 2024d).

With the Declaration, the signatory ministers established the Intergovernmental Council for Buildings and Climate (ICBC). It provides a structured forum for intergovernmental cooperation on addressing the building sector's climate challenges. Supported by the Global Alliance for Buildings and Construction (GlobalABC, hosted by the UN Environment Programme), it promotes the alignment of national building-sector policies with global climate goals; monitors and shares progress; and guides global action through technical briefs and policy recommendations. The ICBC was officially institutionalised at COP29 during a high-level round table focusing on green construction, energy-efficiency in buildings, and climate resilience (GlobalABC, 2024).

Under the Paris Agreement, each committed country is obligated to prepare and submit national climate action plans, also called Nationally Determined Contributions (NDCs). At COP29, ministers, mayors and other world leaders discussed the economic, health and social benefits of building green and highlighted how the forthcoming NDCs 3.0 – due in 2025 – can stimulate climate mitigation and adaptation in the construction sector. The GlobalABC and the Franco-German Programme for Energy Efficiency in Buildings (PEEB) have jointly published guidance for policymakers and practitioners on how to integrate building green initiatives in the 2025 NDC revision (PEEB & GlobalABC, 2024; UNFCC, n.d.).

The OECD has been actively supporting the decarbonisation of the construction sector through a range of initiatives, including policy seminars and round tables on sustainability in the built environment. Through its Decarbonising Buildings in Cities and Regions programme, the OECD has provided insights on best practices and challenges in building green, and has developed policy recommendations to guide national, regional and local governments. Recent programme outputs include a monitoring of national policies for decarbonising and climate-proofing buildings in 28 countries (OECD, 2024a; OECD, 2024b).

At European level, the European Commission announced a Renovation Wave strategy in 2020 as part of the European Green Deal. Recognising that many EU buildings were built before 2000 and have poor energy performance, this initiative aims to double Europe's renovation rate by 2030 to achieve higher energy and resource-efficiency in the built environment (European Commission, 2021a). As one of the key actions under the strategy, the revised Energy Performance of Buildings Directive entered into force in all EU Member States in May 2024. It aims to progressively reduce GHG emissions and energy use in the construction sector by boosting energy renovation rates, supporting better air quality and promoting the roll-out of sustainable transport infrastructure (European Commission, 2024a). It is a key step in aligning the building sector with the EU's climate neutrality goals for 2050.

The European Training Foundation (ETF) supports human capital development in the EU's neighbouring countries, encompassing regions such as the Middle East and North Africa (MENA), the Western Balkans, and Eastern Europe, including Ukraine. Across these diverse regions, the built environment faces various challenges, including the impact of ongoing and recent conflicts, extreme

[1] While there are many national and sub-national policy initiatives related to building green, this section focuses exclusively on international policy efforts, in line with the ETF's focus on global cooperation in changing and innovating lifelong learning systems.

temperatures, environmental degradation and water stress. These factors underscore the relevance of international policy efforts focused on building green and sustainable reconstruction. For instance, the World Green Building Council (WorldGBC – an international NGO) has produced a policy framework for the sustainable reconstruction and recovery of the built environment in the Southern and Eastern Mediterranean in partnership with the UN Human Settlements Programme (UN-Habitat). Supported by the European Bank for Reconstruction and Development (EBRD), the framework presents key issues and approaches under six themes, such as efficient resource utilisation, climate resilience and the integration of social and economic resilience (EBRD, UN-Habitat & WorldGBC, 2022). Ukraine, in particular, is expected to become one of the world's largest reconstruction sites following the military invasion and aggression by Russia, highlighting the urgent need for green building practices and skilled workforce development in its construction sector. For further information on how the ETF supports the development of vocational education and training in EU neighbouring countries, please visit the ETF website.

2. INDUSTRY ADVANCEMENTS AND THE NEED FOR GREEN SKILLS

Key message

The construction sector must integrate advanced green technologies and sustainable materials across all stages to achieve decarbonisation and resource-efficiency. This requires a workforce skilled in building information modelling (BIM) and generative design, renewable energy systems, sustainable materials (e.g. cross-laminated timber), modular construction, 3D printing, circular economy principles and green building standards (LEED, BREEAM). Continuous upskilling and strong digital literacy are essential to keep pace with evolving environmental regulations and technological innovations.

Innovative approaches and solutions are needed across the entire construction value chain to succeed in the greening of the construction sector. Financing green construction projects is crucial for decarbonising the sector and achieving global sustainability goals, as it enables the adoption of energy- and resource-efficient technologies alongside circular economy principles. Adequate funding supports the development of a skilled workforce, empowers businesses to invest in green innovation, and stimulates market demand for less carbon-intensive buildings. In practice, this translates to deploying more sustainable practices and technologies across the entire construction value chain.

The construction value chain encompasses all stages, from planning, design and financing to material production, logistics, construction, operation, renovation, and ultimately deconstruction or demolition. It involves a wide array of stakeholders, including architects, engineers, manufacturers, contractors, suppliers, facility managers and waste processors, each contributing to a building's life cycle. Understanding the full value chain is crucial because sustainability challenges and opportunities are distributed across all these stages, not confined to the construction site alone (GIZ, 2023a). For example, decisions made in the design phase – such as material selection or building orientation – directly influence energy consumption, resource use and recyclability later on. Likewise, the sourcing and production of construction materials have a significant impact on emissions and resource extraction, underlining the need for green skills in material science and procurement.

To achieve the circular flow of resources and reduce environmental impact, it is essential that players across the value chain cooperate (WEF, 2024). Technological advancements and the adoption of sustainable practices play a crucial part in this endeavour. New digital technologies, for instance, can improve the energy- and resource-efficiency of buildings in their design stage. A specific example is generative building design, where users enter different data points – such as design goals, materials and cost constraints – into software, using sophisticated algorithms to analyse and explore a vast range of design possibilities. Generative building design typically leverages building information modelling (BIM) software, which combines 3D modelling of the physical and functional characteristics of a building or infrastructure facility with rich data integration (e.g. geospatial, part- and material-based information). By using specified parameters, architects and other construction partners can optimise building design for factors like natural lighting, material use and natural ventilation (Foster, 2023; Sharon, 2023).

A trend towards greater use of sustainable materials is another contributing factor. For instance, cross-laminated timber (CLT) is increasingly utilised as a bio-based building material, offering strength comparable to concrete and steel while being significantly lighter. CLT's lighter weight reduces transportation emissions, and its bio-based nature contributes to carbon sequestration. Furthermore, its prefabricated nature allows for efficient construction and minimises on-site waste (Rany, 2023). Other examples of renewable building materials include the use of cork in flooring, valued for its durability and acoustic insulation properties; the use of eelgrass in acoustic and thermal insulation,

providing a locally sourced and biodegradable alternative; and the use of hempcrete, a mixture of hemp fibres and lime, as a key ingredient in concrete, offering better insulation and lower embodied carbon than traditional concrete (Hirshberg, 2023; INRAE, 2023; Nordic Innovation, 2024). Bamboo, with its rapid growth and high strength, is also gaining traction as a sustainable structural material, particularly in regions where it is readily available. Mycelium, the root structure of fungi, is being explored as a biodegradable and versatile material for – among other use cases – insulation and structural components (Yadav & Mathur, 2021; Madusanka, 2024). Furthermore, there are growing efforts to reduce the consumption of virgin resources by developing technologies and processes for greater use of recycled materials – such as bricks, concrete, steel and wood – reclaimed from building deconstruction (ECESP, 2021).

Construction processes are also moving towards greater resource-efficiency, thanks to technological developments. One example is prefabrication, where building components are pre-built off-site in controlled factory settings to increase efficiency and minimise waste, then later transported to the construction site and assembled there. Prefabrication not only reduces material waste, but also improves quality control, speeds up construction time, and minimises on-site disruption. Another example is 3D printing with concrete, where building components or entire structures can be printed with great precision on-site, minimising material consumption and allowing for complex designs that would be difficult or impossible to achieve with traditional methods (Tabassum & Ajaz, 2023; UCEM, 2024). Moreover, a greater focus on design for deconstruction (DfD) principles, which prioritise easy disassembly and reuse of building components at the end of a building's life, is transforming construction processes and contributing to a more circular and sustainable built environment (European Commission, 2024b).

Finally, advancements are made in terms of greening the operation of buildings. For instance, integrating green roofs and façades has numerous benefits, including improved building insulation and air quality (Nasr, 2024). Solar photovoltaic systems can be added to buildings to reduce their carbon footprint and improve energy independence. Last but not least, building management systems, comprised of software, sensors and other devices, allow for greater energy-efficiency by intelligently managing lighting, heating and cooling based on the real-time occupancy of buildings and environmental conditions (Rawal, 2024; BUILD UP, 2024).

The shift to more sustainable working methods and technologies, such as those exemplified above, translates to a significant demand for green skills in the construction sector. Across all skill levels, competencies linked to energy efficiency and circular economy principles are required, while there is also a growing need for specialist workers able to implement greening technologies and solutions (GIZ, 2023a). This impacts the entire value chain, from planning and design to construction, operation, and eventual deconstruction or demolition, thus influencing diverse occupational profiles. Workers need both sector-specific knowledge of sustainable practices and green building certifications (e.g. LEED and BREEAM), as well as transferable skills like digital literacy, problem-solving and adaptability. The increasing use of BIM and other digital tools requires enhanced digital competencies across the workforce. Furthermore, prefabrication, modular construction and 3D printing demand specialist technical skills in operating advanced equipment and managing innovative processes. The drive for greater energy- and resource-efficiency necessitates expertise in renewable energy integration, material recycling, design for deconstruction, and sustainable waste management. This translates to a need for occupation-specific green skills, including carpenters skilled in prefabrication and low-carbon materials; electricians specialising in photovoltaics and energy-efficient lighting; plumbers proficient in rainwater harvesting and greywater recycling; HVAC technicians trained in geothermal systems; and insulation installers adept at applying eco-friendly materials.

The table below offers an overview of green skill needs in construction. It is not exhaustive but illustrates the range of skills needed for a more sustainable construction sector. The table also features examples of occupation-specific skills focusing on vocational professions.

Table 1: Overview of green skill needs in sustainable construction

Generic/ transferable skills:	Leadership, teamwork and project management skills for coordinating construction projects and cross-sectoral collaboration. Digital literacy, including the use of building information modelling (BIM), digital twins, and other construction-related software. Communication skills for engaging with stakeholders, clients, public agencies and team members. Problem-solving and adaptability to new regulations, technologies and market requirements. Self-learning and commitment to lifelong learning, including the ability to upskill as technologies change. Entrepreneurial skills for identifying business opportunities in green construction and managing small enterprises.
Sector-specific skills:	Knowledge of sustainable construction methods (e.g. passive house design, modular and prefabricated construction). Understanding and applying circular economy principles and life cycle approaches in construction (design for deconstruction, recycling of materials). Familiarity with innovative, eco-friendly and local building materials (e.g. cross-laminated timber, hempcrete, biodegradable paints). Skills in energy efficiency, renewable energy integration (e.g. installation of solar PV, heat pumps, energy management systems). Awareness of water and resource conservation strategies (e.g. integrated water, wastewater and waste disposal systems, and greywater recycling). Knowledge of building codes, certification standards (e.g. LEED, BREEAM, EDGE) and regulatory compliance. Understanding occupational health and safety in the context of new green technologies and materials.
Occupation-specific skills: (focus on vocational professions)	Electricians: Installation, commissioning and maintenance of photovoltaic (solar) systems, energy management systems and energy-efficient lighting; integration of smart building controls. Plumbers / gas fitters: Installation of rainwater harvesting, greywater recycling, and efficient plumbing systems; set-up and maintenance of heat pumps and solar thermal systems. HVAC technicians: Installation and maintenance of energy-efficient heating, ventilation and air-conditioning systems, including passive/active cooling, heat recovery and phase-change materials. Carpenters: Use of sustainable and local timber (e.g. cross-laminated timber), modular construction assembly, and traditional craftsmanship adapted to modern green standards. Bricklayers: Application of eco-friendly bricks (e.g. compressed earth bricks), natural insulation, and techniques that reduce embodied carbon and waste. Roofers: Installation of green roofs, integration of solar panels into roofing, and application of advanced insulation materials. Painters: Use of biodegradable and low-VOC paints, sustainable surface treatments.

Source: Authors' elaboration based on GIZ, 2023a.

Currently, only around 25% of workers in the construction sector are estimated to have at least one green skill (LinkedIn Economic Graph, 2023). A large share of the existing construction workforce therefore needs upskilling and reskilling to adapt to new technologies, materials and processes related to building green. This highlights the importance of targeted training programmes that address specific green building skills and consider lifelong learning. As the construction industry keeps evolving, continuous learning and professional development are crucial for construction workers to stay up to date with the latest advancements.

It is likewise essential to attract new talent by promoting construction careers and developing educational programmes that equip young students with the knowledge and skills needed to build green. According to global estimates by the International Labour Organization (ILO), the green transition could create up to 18 million additional jobs in construction by 2030. At the same time, the sector is challenged by an ageing workforce – at least in some countries – and must replace many retiring workers (CEDEFOP, 2023; ILO, 2024).

3. DYNAMIC SKILLS ECOSYSTEMS IN SUPPORT OF BUILDING GREEN

Key message

Centres of vocational excellence (CoVEs) lead the green transition in the construction sector through a **whole-institution approach**, embedding sustainability across curricula, teaching, partnerships, funding and policies. This holistic integration ensures that green skills become a core part of vocational education.

At the same time, CoVEs operate as **dynamic skills ecosystems** – flexible networks that bring together VET providers, employers, industry, authorities and research partners. This collaboration enables CoVEs to quickly adapt training to evolving green technologies and sector needs, making them especially effective in addressing the complex, fast-changing demands of sustainable construction.

CoVEs can help lead the way in the greening of the construction sector. They can be described as dynamic skills ecosystems – meaning networks of VET institutions and a wide range of local or regional stakeholders that collaborate on skills provision, innovation, regional development and social inclusion. The composition of CoVEs is flexible and adaptable: depending on evolving needs, their core partnerships may be driven by VET providers, sector associations, employers, public authorities or other relevant stakeholders, with leadership roles possibly shifting as priorities change.

KEY FEATURES OF CENTRES OF VOCATIONAL EXCELLENCE (COVES)

- **Specialised focus**: CoVEs excel in specific vocational fields, using a bottom-up, responsive approach.
- **Flexible and adaptive**: Open to new partnerships (e.g. research centres, start-ups) and quick to adapt training to tech, regulation and labour trends.
- **Strong partnerships**: Collaborate with employers, industry and local/regional governments to ensure that training reflects real-world needs.
- **Innovation hubs**: Engage in applied research, pilot new methods and promote entrepreneurship among students.
- **International outlook**: Active in global networks like the ETF's Network for Excellence to share best practices.
- **Lifelong learning**: Support upskilling and reskilling for both youth and adults.
- **Access to funding**: Leverage public-private financing (EU funds, development banks, etc.) for sustainable growth and green projects.
- **Agile and future-ready**: Especially valuable in sectors like construction, where they adapt training to green technologies and emerging skills needs

CoVEs distinguish themselves by specialising in specific vocational fields and taking a bottom-up approach to vocational excellence. Their ability to adapt allows them to integrate new partners, such as research organisations, civil society or start-ups, when opportunities for collaboration or innovation arise. Harnessing close partnerships between VET providers, employers, industry associations, and local or regional governments, CoVEs can deliver high-quality training that is continually updated to reflect technological advances, regulatory shifts and changing labour market demands. They are agile in responding to employer feedback and labour market intelligence, focused on adjusting their

curricula and training offers accordingly, and aim to promote lifelong learning through upskilling and reskilling initiatives for both young learners and adults.

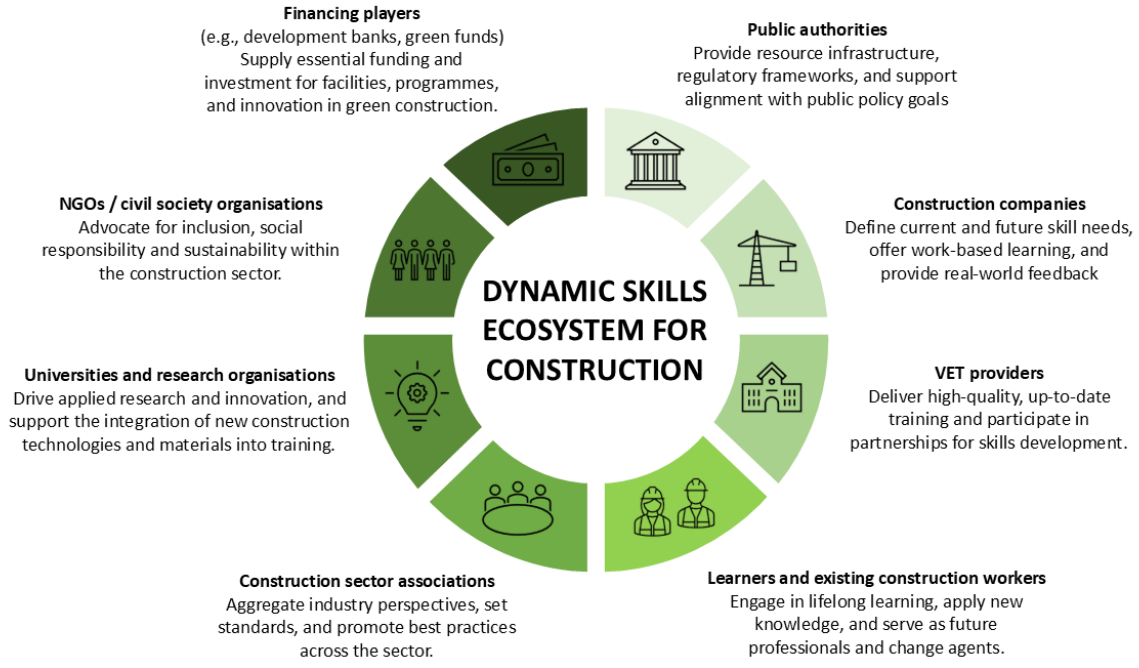
By engaging with companies and universities in applied research projects, piloting new approaches and promoting entrepreneurial initiatives among students, CoVEs serve as hubs of experimentation and innovation, supporting local business development and driving regional transformation. They seek partnerships across borders and participate in international networks to promote knowledge and best practices within VET, such as the ETF's Network for Excellence (ENE) (ETF, 2023b).

A critical feature of these ecosystems is access to financing, which may stem from public funds or the inclusion of financing players, such as development banks, grant-giving agencies, public-private partnerships, EU funds and private investors. These stakeholders play a pivotal role by enabling CoVEs to access the necessary resources for developing new curricula, investing in sustainable infrastructure, upskilling teaching staff, implementing green projects, and other relevant activities. As the green transition accelerates, collaboration with financial institutions and targeted funding initiatives is becoming ever more important for ensuring that CoVEs can lead in sustainability and excellence (ETF, 2023b).

The unique attributes of CoVEs – including specialisation, adaptable partnership structures, close industry ties, emphasis on innovation, lifelong learning and an international outlook – position them as pivotal players in developing a skilled and resilient workforce ready for a just and green transition. Their adaptability is especially valuable in the context of the construction sector, where the value chain is complex and rapidly evolving, being comprised of a wide range of stakeholders from material suppliers and designers to contractors, regulators and end users. As new green technologies, materials and standards emerge, CoVEs can reconfigure their partnerships, update training content, and engage relevant stakeholders across the value chain to address emerging skill needs. This agility enables them to respond to sectoral shifts, integrate cutting-edge sustainability practices, and ensure that training remains aligned with both immediate industry demands and long-term environmental goals (ETF, 2023a).

The infographic below visualises the dynamic skills ecosystem for construction, presenting the range of stakeholders that can be included, as well as describing their individual contributions:

Figure 1: The dynamic skills ecosystem for construction



Source: Authors' elaboration based on ETF, 2023b.

Through vocational excellence in education, collaboration and innovation, CoVEs can champion practical and inclusive solutions to climate challenges while inspiring and guiding the development of other local and regional training providers. Their dynamic and responsive nature makes them particularly well-suited to bridge the significant green skills gap in the construction sector, thereby contributing meaningfully to reducing its overall climate and environmental impact. The following section examines how CoVEs in ENE are advancing the greening of VET, with specific examples of how they promote innovation and skills for the green transition.

Against this background, CoVEs are vital for bridging the significant green skills gap in the construction sector, and thus have an important role to play in reducing its overall climate and environmental impact. The following section examines how the ETF's GRETA partnership supports the greening activities of CoVEs, while also presenting specific examples of how CoVEs can promote innovation and skills for a more sustainable construction sector.

3.1. Greening activities of centres of vocational excellence

Using a whole-institution approach is essential for effectively greening VET and developing green skills for the transition to a sustainable economy. GRETA has developed a whole-institution approach tailored specifically to the unique characteristics of CoVEs. This approach ensures that sustainability is integrated across all areas of the institution – curricula, operations, partnerships and policies – helping CoVEs lead the green transition and equip learners with the skills needed for the future.

This whole-institution approach ensures that sustainability is fully integrated into every aspect of a VET institution's operations, making it a central part of the institution's identity and activities, aligning them with the broader goals of the green transition. It fosters a culture of environmental responsibility that permeates all activities, from curriculum design to institutional policies. The approach includes several key dimensions, each contributing to the integration of sustainability:

1. **Curricula**: A primary focus is on aligning training programmes with green skills and sustainable practices. CoVEs ensure that their curricula are continuously updated to reflect advancements in green technologies and environmental challenges. This enables learners to gain the competencies necessary to thrive in a low-carbon, sustainable economy and equips them with the skills required by industries undergoing the green transition.
2. **Teacher training**: Another vital component is preparing educators to teach green topics effectively. CoVEs invest in professional development for teachers to ensure that they have both the subject knowledge and teaching methods needed to integrate sustainability into their lessons. This helps educators inspire students to adopt green practices and foster innovation in sustainability.
3. **Partnerships**: The success of this approach depends on strong collaborations with external stakeholders. CoVEs build relationships with industry leaders, local governments, NGOs and other relevant organisations to ensure that the training provided aligns with market needs. These partnerships offer learners practical experience in sustainability and ensure that education is grounded in real-world, sustainable practices.
4. **Funding and investment**: The approach also emphasises securing the resources needed to advance sustainability. This includes investments in green infrastructure, such as energy-efficient facilities or renewable energy technologies, as well as ensuring that financial resources are directed towards supporting sustainable initiatives within the institution. Public-private partnerships are particularly important, as they enable CoVEs to access additional funding, expertise and support from both the public and private sectors.
5. **Strategies and policies**: CoVEs develop comprehensive, long-term strategies and policies that embed sustainability at all levels of the institution. These strategies cover everything from governance to daily operations, ensuring that sustainability is not treated as a separate initiative but is woven into the institution's mission, values and practices. By establishing clear policies and long-

term goals, CoVEs ensure the continued focus on sustainability and support for the green transition.

Together, these dimensions create a holistic, coordinated approach that enables VET institutions to play a central role in fostering sustainability and driving the green transition across industries.

To foster the greening of the construction sector, VET providers need to collaborate closely with employers and relevant industry associations to research current and future skill needs within the industry and align training programmes accordingly. Collaborations with companies to this end can be challenging, partly because skill needs may differ across consulted employers, but primarily because formal education systems tend to adapt slowly to shifting labour market demands. The need for greater adaptability to industry demands is one of the main reasons CoVEs are being 'purpose-built' or created as designated entities in line with national or regional arrangements in some countries, particularly those with evolving VET systems (European Commission, 2019).

Beyond strong collaborations with employers, CoVEs can support the greening of the construction sector in further ways. At a general level, initiatives can focus on fostering a green mindset among students, for example by transferring knowledge of the construction sector's climate and environmental impact and the importance of energy conservation and waste reduction for decarbonisation. Building on this foundation, students can be encouraged to explore innovative solutions through participation in competitions or engagement in applied research projects facilitated in collaboration between VET providers and research organisations. In Denmark, for example, a collaboration between several universities and VET institutions is currently developing more sustainable and climate-friendly construction processes. Under the name Knowledge-Based Green Transition of Carpentry Education, the project involves training courses for carpentry students in participating VET schools. These students will build and test the qualities of wall elements using hemp blocks (instead of aerated concrete) and seaweed for insulation (University of Copenhagen, 2023).

As previously mentioned, many existing workers in the construction sector lack green skills, which poses a significant challenge for the industry. Most prominently, there is a growing demand for expertise in retrofitting and sustainable refurbishment techniques, familiarity with low-carbon and eco-friendly building materials, proficiency in energy efficiency assessment and environmental building modelling, knowledge of waste reduction and circular construction practices, and experience with environmental certification standards (Atkins Search, 2025). It is thus essential that CoVEs specialising in construction offer reskilling programmes and on-the-job training to provide existing workers with relevant skills. Since CoVEs cannot bridge the construction sector's green skills gap alone, they must collaborate with other VET schools and training providers, helping them strengthen their training content and quality by sharing state-of-the-art knowledge of green building practices and technologies.

The examples above underline the importance of strong partnerships focused on skills provision and innovation to support green building efforts. As local or regional skills ecosystems, CoVEs specialising in construction act as strategic enablers of sector greening, leveraging the strengths of various stakeholders – including VET providers, local and regional authorities, construction companies and associations, NGOs, and research organisations – to deliver vocational excellence and green building skills.

This collaborative approach aligns well with the smart specialisation framework, which encourages regions to identify and build on their unique strengths and competitive advantages (ETF, 2019; European Commission, 2021b). By adopting smart specialisation principles, CoVEs can enhance their effectiveness through targeted prioritisation of regional construction assets and capabilities. Rather than implementing generic green skills programmes, smart specialisation enables skill providers to focus on specific areas where their region has distinct potential to excel in sustainable construction. For some regions, for instance, it may make sense to focus on energy renovations, while other regions with a particularly old building mass may focus on reusing building materials from deconstruction.

The advantages of this approach are substantial. First, it ensures that VET programmes are tailored to regional market needs, producing graduates with skills directly relevant to local green construction

projects and employers. Second, it fosters enhanced stakeholder collaboration through the quadruple helix model, bringing together public authorities, businesses, academia and civil society to co-create responsive training solutions. This collaborative ecosystem enables skill providers to rapidly adapt to technological innovations and evolving regulatory frameworks in sustainable construction.

Furthermore, aligning with smart specialisation priorities and the Union of Skills opens access to targeted funding streams from EU and regional sources (European Commission, 2023), to support the development of specialist green skills curricula and teaching infrastructure. It also promotes a culture of excellence and innovation by connecting VET providers with research institutions and businesses.

By establishing resilient mechanisms for continuously upskilling and reskilling the existing workforce, CoVEs can ensure that construction professionals remain at the forefront of green technologies and practices, supporting the sector's sustainable transformation while addressing regional development priorities.

4. BUILDING GREEN: PRACTICE EXAMPLES AND INSIGHTS

Key message

The GRETA initiative highlights the power of peer learning and collaboration among diverse stakeholders to advance sustainable construction skills. By exploring different dimensions – such as career guidance, hands-on training, teacher development, green curricula, partnerships, innovation and financing – participants gain valuable insights that help build a more adaptable and future-ready workforce. This collective approach fosters vocational excellence and sustainability, showing how sharing best practices across regions and sectors can drive a stronger, greener construction industry.

As part of the GRETA initiative, a series of online learning sessions titled 'BUILDING GREEN – together' focus on promoting sustainable construction practices within the partnership. These sessions have brought together a diverse group of international stakeholders, including representatives from CoVEs, government, industry associations, research organisations and others. The goal is to exchange knowledge and best practices on developing vocational education and training (VET) to support a sustainable construction sector. Key topics discussed include student recruitment, curriculum development, inclusive practices, public-private partnerships, skills delivery and teacher training.

The following is a selection of practice examples shared during the 'BUILDING GREEN – together' sessions, as well as additional inspiring cases[2].

To provide a comprehensive understanding of how different stakeholders are addressing the green skills gap in the construction sector, the examples have been categorised to reflect key dimensions of skills ecosystems for sustainable construction. These include:

- Career guidance and certification to align workforce competencies with industry needs.
- Practice-oriented training to ensure hands-on experience in green construction.
- Teacher training, enabling educators to deliver high-quality green skills.
- Integrating green skills into VET curricula to support the green transition.
- Public-private partnerships to ensure training relevance and innovation.
- Expansion of skills ecosystems through collaboration with social partners.
- Collaboration with research and innovation partners to align cutting-edge advancements with skills provision.
- Green finance and investment to strengthen skills development.

Together, these categories represent fundamental dimensions of skills provision and innovation, serving as key enablers for both vocational excellence and the greening of the construction sector. They offer not only practical insights, but also strategic direction for those working to build a workforce equipped for the demands of a sustainable future. In the current context of rapid environmental and technological change, excellence in vocational education and training is no longer defined solely by technical competence. It increasingly depends on the integration of sustainability, adaptability and

[2] The case descriptions are based on presentations given at the GRETA online seminars, as well as any additionally referenced literature. More information, including presentations and seminar reports from the building green sessions, can be found on the ETF's GRETA blog.

relevance. These themes reflect a holistic and forward-looking approach, where each element contributes to a coherent, systemic shift in how skills are developed and delivered. Vocational excellence and sustainability are mutually reinforcing progress as one strengthens the other. Advancing both in tandem is essential for building a construction sector that is resilient, future-oriented, and aligned with the goals of a green transition.

4.1 Certification and career guidance promoting employment and training opportunities

As the construction sector integrates new technologies and sustainable practices, career guidance and VET are essential to developing the competencies needed. Through competency-based education, VET ensures that workers acquire both technical and transferable skills aligned with industry needs.

Assessing and certifying competencies – including the recognition of prior learning (RPL) and industry-standard certifications – are crucial for preparing workers in green construction and the energy efficiency of buildings. The VOC-Test Centres in Türkiye are instrumental in evaluating and certifying the skills of workers across various sectors, including construction. These centres ensure that workers meet industry standards for both traditional construction and emerging green building techniques, fostering the growth of a highly skilled workforce prepared for the sector's future.

VOC-Test Centres, Türkiye

VOC-Test Centres in Türkiye are specialist institutions dedicated to assessing and certifying vocational skills across various sectors, with a particular focus on construction. These centres operate under the Vocational Qualifications Authority (VQA), which manages the national qualifications framework and ensures alignment with European standards.

VOC-Test Centres contribute significantly to career guidance by helping individuals understand the specific competencies and qualifications required for various construction sector roles. Through competency-based assessments and certification, these centres establish clear benchmarks for the skills needed in different professions, helping individuals make informed decisions about their career paths.

(Image: VQA)

In the construction sector, several VOC-Test Centres have been established to evaluate competencies in a wide range of construction-related professions. One example is the Employers' Union of Turkish Construction Industrialists (İNTES), which has developed national occupational standards and qualifications for 27 different construction vocations. They have successfully issued over 30 000 competence certificates in 19 distinct professions, thereby improving the quality and professionalism within the construction industry.

In Ireland, Education and Training Boards Ireland (ETBI) has implemented initiatives to address the green skills gap in construction. Initiatives like the FET Skills Box guide workers toward sustainable construction practices and offer valuable career pathways in green building, ensuring that the workforce is ready for the demands of a more sustainable construction industry. It not only helps overcome outdated perceptions of the building sector as low-tech, but also increases trainee recruitment by showcasing career opportunities linked to sustainable practices and digital tools for building green.

Education and Training Boards Ireland (ETBI) – Further Education & Training Skills Box

As the national representative association of Ireland's 16 regional Education and Training Boards, ETBI is responsible for advancing national education and training. Recognising a lack of awareness among young students and their families of the diverse career choices and pathways within further education and training (FET)[3], ETBI developed materials for career guidance councillors in the form of the FET Skills Box.

The A4-sized box contains five career charts listing available training programmes and courses in the following sectors: Business, Climate & Green, Construction, Healthcare and Tourism. Career guidance counsellors are meant to use the career charts as discussion documents to explore skills training pathways. They are primarily aimed at school students in their last two years of secondary school (also known as post-primary school in Ireland), while also being relevant for early school leavers and people wishing to upskill or to have a career change.

The career charts were developed by ETBI's Future Building Skills unit, which initially aimed to promote training and employment opportunities within construction, but later expanded the scope of the FET Skills Box. Each career chart is structured according to relevant work or technical areas in a given sector. Notably, the training opportunities in the career chart for construction are also arranged by qualification level (Entry Level, Next Level, Skilled Craftpersons and Engineering). Alongside the career chart focusing on Climate & Green, it is also the only one highlighting available training and upskilling opportunities for green skills (see image below).

To create an overview of training opportunities in the career charts, ETBI's Future Building Skills unit had to draw on and combine information from numerous online sources, such as the websites of the 16 regional Education and Training Boards. The QR codes at the bottom of each chart lead to the FET Skills Box website, where users can find links to websites with further information on each listed training opportunity, including entry requirements, programme content and skills providers. Online resources are updated regularly.

The FET Skills Box has been distributed to over 720 Senior Cycle schools and all career guidance counsellors in Ireland. Case officers in Ireland's Department of Social Protection are using it with jobseekers.

[3] Further education and training is a sector of the Irish education system that provides a wide range of education and training programmes to individuals after they have completed secondary education, or for those who wish to upskill, reskill or return to education at any stage in life. The sector includes VET, but is broader in scope, also including non-vocational courses such as community education, basic literacy programmes and general education pathways (e.g. for learners returning to education) (ETBI, n.d.).

ETBI's career chart for construction (source: ETBI, 2024).

4.2 Enabling practice-oriented training

As the global construction sector shifts towards more sustainable practices, the need for a workforce equipped with green skills has never been more critical. To bridge the green skills gap, VET systems must adapt, integrating energy-efficient construction techniques and sustainable building practices into their curricula. However, the success of these training programmes hinges not only on the technical competencies they provide, but also on ensuring gender equity in a traditionally male-dominated industry. Without concerted efforts to create inclusive opportunities for women, the sector risks missing out on a large and valuable talent pool.

Addressing both the green skills gap and gender imbalance requires comprehensive and adaptive curricula that are directly aligned with industry needs. It is not enough for VET programmes to focus solely on technical skills; they must also foster collaboration between industry, VET providers and government to ensure that the training offered is relevant, up to date and able to meet the demands of a green economy.

Apprenticeships are essential in the construction sector, offering a blend of practical experience and theoretical knowledge. This hands-on approach helps apprentices develop the skills needed to meet industry demands, particularly in areas like green construction and energy-efficient building practices.

The TRAINEE Project in North Macedonia exemplifies how apprenticeship models can drive innovation and sustainability in the construction sector, training professionals in energy-efficient building practices.

TRAINEE project, North Macedonia

The TRAINEE project in North Macedonia, funded by the EU under the Erasmus+ programme, focuses on training the workforce for the green economy by providing vocational education in energy-efficient construction and sustainable building practices. Central to the project is its apprenticeship model, which blends theoretical learning with hands-on experience to equip apprentices with the skills needed in the green construction sector.

The apprenticeship model follows a dual education system, ensuring that apprentices gain both theoretical knowledge and practical experience.

The success of the apprenticeship programme relies on collaboration between VET providers and local enterprises. Institutions like the Vocational School for Construction and Geodesy and the Center for Innovation and Education (CIE) provide foundational training, while companies such as GPP Construct, Semos, and Energija Group offer hands-on learning and mentorship in sustainable building practices.

In the construction sector, where practical skills are essential, alternative training provisions that focus on real-world, hands-on learning are central for developing a competent workforce. These types of programmes provide immediate, relevant skills that address the specific needs of industries, ensuring that workers can meet the ever-evolving demands of their professions. This training helps bridge the gap between theoretical education and practical application, especially in industries that require continuous upskilling due to new technologies and safety standards.

The Institute of Construction of Albania (ICA) offers an excellent example of this type of practice-oriented training. Although it does not provide formal vocational education, ICA plays a critical role in the construction sector by offering specialised certification courses, workshops, and short programmes.

Institute of Construction, Albania

The Institute of Construction of Albania (ICA) is a state-owned institution under the Ministry of Infrastructure and Energy, tasked with ensuring the quality, safety, and technical standards of construction projects in Albania. Although the ICA does not offer formal vocational education and training (VET) programmes, it plays a crucial role in supporting workforce development through specialist certification courses, short programmes and workshops for construction professionals.

These programmes cover essential topics such as construction safety, materials testing, quality control and modern building techniques. Specific courses include construction management, focusing on project planning and management skills; FIDIC contracts, which teaches professionals how to handle construction disputes and claims; and building information modelling training, which addresses the growing technological needs of the sector.

Visit the Ministry's site here:
https://www.infrastruktura.gov.al

The Institute of Construction of Albania (Image: ICA)

As the war in Ukraine continues, the urgent need for skilled workers in the construction sector grows. Rebuilding the country's infrastructure amid ongoing conflict requires a workforce capable of meeting both immediate reconstruction needs and future development goals.

The Odesa Centre for Vocational Education (OCVE) has established a Training and Practical Center focused on green construction and energy-efficient building practices, ensuring that students gain modern skills aligned with sustainable construction. Similarly, Kremenchuk Higher Vocational School No 7 has set up a Training and Practice Centre that provides students with direct, hands-on experience in key construction trades, such as bricklaying, plumbing and carpentry. These centres ensure that students are equipped with the necessary skills to address the sector's demands during this critical period.

Odesa Centre for Vocational Education, Ukraine

The Odesa Centre for Vocational Education (OCVE) is a leading institution in Ukraine, serving over 1 000 students annually with specialist vocational training in fields including construction and welding programmes. The Centre offers both in-person and remote courses to ensure uninterrupted education, even during the challenging times due to the war in Ukraine.

In 2023, OCVE established a new Training and Practical Center (TPC) to enhance its ability to deliver specialist training in green construction practices. The TPC focuses on modern welding technologies and eco-friendly construction techniques, equipping students with practical, hands-on skills essential for sustainable building practices. One of the key areas of training includes energy-efficient welding, where students learn welding methods that reduce energy consumption and support the creation of structures with lower carbon footprints.

In addition, the TPC offers courses in sustainable plumbing systems, teaching students how to install and maintain water-efficient plumbing designs. These systems are crucial for reducing environmental impact by conserving water and minimising energy use in construction.

The Centre has formed partnerships with key industry players to ensure the relevance and quality of its training programmes. For instance, OCVE collaborates with local and international construction enterprises to align its curriculum with real-world industry standards. In December 2024, OCVE signed a memorandum of cooperation with DroneUA, a leading company in unmanned aerial vehicle (UAV) technology, to provide students with training in drone technology. This collaboration integrates cutting-edge technology into OCVE's training, particularly in areas such as construction site monitoring, surveying, and environmental data collection, further aligning the curriculum with sustainable building practices.

Kremenchuk Higher Vocational School No 7, Ukraine

Kremenchuk Higher Vocational School No 7 provides specialist training for students in a range of vocational fields, including construction. The school's Training and Practice Centre is central to its mission of delivering hands-on, practical training that equips students with the skills they need to succeed in their chosen professions.

As of February 2025, Kremenchuk Higher Vocational School No 7 had over 900 students enrolled. Approximately 200 of these students were actively engaged in the newly modernised Training and Practice Centre, which was officially opened on 6 February 2025. This centre was equipped with 72 units of advanced machinery, including CNC milling and turning machines, fibre lasers and other high-tech tools, thanks to a EUR 1.4 million investment from the EU and the Ukrainian government.

For construction students, the Training and Practice Centre offers extensive hands-on experience in key construction trades such as bricklaying, carpentry, plumbing and electrical installation. The students work with real construction materials and tools, providing them with a direct understanding of the work they will encounter in the field.

The school collaborates with local construction companies, providing opportunities for students to engage in internships and apprenticeships. These industry partnerships are essential to bridging the gap between classroom learning and actual on-the-job experience. Students benefit from exposure to live construction projects, allowing them to apply their skills and gain practical experience in the field.

The GIZ Build4Skills initiative serves as another inspiring example. Through its work in different countries, the initiative is reshaping vocational training by embedding hands-on learning within real-world infrastructure projects. The programme not only enhances the technical skills required for sustainable construction, but also actively promotes gender equity, ensuring that women are equipped to take on leadership roles in the sector. By fostering strong partnerships between VET providers, industry stakeholders and government agencies, the project ensures that its training programmes are both responsive to green economy needs and inclusive of diverse talent.

German Agency for International Cooperation (GIZ) – Build4Skills

Build4Skills is an international initiative commissioned by the German Federal Ministry for Economic Cooperation and Development (BMZ) and implemented by GIZ in the period 2021 to 2025. Active in Kenya, Pakistan, Senegal and South Africa, Build4Skills collaborates with several development banks, including the Asian Development Bank (ADB) and the African Development Bank (AfDB), to integrate practice-oriented education into large-scale infrastructure projects.

A Build4Skills trainee in Kenya (Image: GIZ)

At the core of the initiative is the innovative use of infrastructure construction sites as training grounds for technical VET students. By deploying students to real-world work environments, Build4Skills ensures that trainees gain hands-on experience, preparing them to meet the demands of the construction industry. A notable feature of the initiative is the training provided to in-company instructors. These trainers receive education on didactics, occupational safety and gender sensitivity, ensuring that learning content is delivered effectively and equitably.

The initiative emphasises gender equity as a priority. Targeted activities promote the participation of women and girls in the construction sector. For example, in Kenya, Build4Skills has partnered with the NGO Buildher to establish an online platform that connects employers with skilled female construction workers, while in Senegal, a mentoring programme led by female managers provides soft skills training and leadership development for women in the sector.

4.3 Teacher training in support of green skills provision

Teacher training in support of green skills provision is a key thematic focus of GRETA and a central element of its comprehensive approach to greening. GRETA emphasises the importance of equipping teachers and trainers with the necessary expertise and competencies to effectively deliver high-quality green skills. This focus is vital for addressing the significant green skills gap in various industries, particularly in the construction sector, which is undergoing a major transition toward sustainability.

Currently, teachers, especially in the construction industry, lack the specific green competencies needed to train the next generation of workers in sustainable practices. A 2024 study by the International Labour Organization (ILO) revealed that nearly 60% of VET instructors worldwide lack sufficient green skills to effectively teach sustainable practices in industries like construction, energy and manufacturing (ILO, 2024).

Without adequately trained educators, it becomes increasingly difficult to prepare workers to adopt and implement sustainable methods and technologies, ultimately hindering the transition to a greener economy.

The Centre of Excellence in Construction in Moldova follows a systematic approach to the professional development of teachers and trainers. It is involved in several initiatives to promote green building practices and sustainability. For example, it offers specialist VET courses on solar power systems, thermal insulation and sustainable building materials. Additionally, the Centre is working to introduce a new course on geothermal installations. It also collaborates with industry partners to enhance the teachers' continued professional development of green skills within the construction sector.

Centre of Excellence in Construction (Moldova) – green teacher training

The Centre of Excellence in Construction in Moldova has organised green teacher training to address the needs of a rapidly changing construction sector. Through collaboration between the Centre and industry partners, the initiative managed to equip over 500 teachers from 13 VET schools in Moldova with skills and knowledge related to building green.

The teacher training focused on various themes, including utilising sustainable building materials, waste management, green building techniques and energy efficiency. In line with these activities, company partners in the construction industry visited the Centre – or opened the doors to their own demonstration and building sites – to share expertise in green materials, technologies and building practices.

Teacher training focussing on hemp as a green building material (Image: Center of Excellence in Construction)

Company partners demonstrated the use of industrial hemp and low-carbon concrete at the Centre. During their green training, teachers visited a ventilation and heat recovery company and toured construction sites of energy-efficient houses built with sustainably sourced wood. They also received training on passive house construction, focusing on energy-saving design and high indoor air quality.

Another example comes from Colleges and Institutes Canada (CICan) and focuses on training modules for teachers that enable them to integrate climate literacy and indigenous knowledge into skills provision for construction. CICan is a national organisation representing the interests of publicly funded post-secondary education institutions (colleges, institutes, cégeps and polytechnics) in Canada. While it is not a government entity, CICan works closely with federal, provincial and territorial governments, as well as with industry and international partners, to advance education and skills training.

Colleges and Institutes Canada (CICan) – greening construction trades with faculty training modules

Through its ImpAct-Climate initiative, CICan is spearheading efforts to integrate sustainability into post-secondary education for the construction sector, while emphasising the importance of incorporating indigenous perspectives in this process. These efforts aim to prepare construction workers to meet the challenges of climate change while fostering social justice and equity.

Against this background, CICan has published a range of professional development modules for trades instructors in carpentry, electrical installations, landscaping and HVACR (heating, ventilation, air conditioning and refrigeration). These modules are aligned with the UN's Sustainable Development Goal 13 on climate action and were developed in collaboration with several colleges and higher educational

institutions, alongside input from indigenous consultants, curriculum designers and climate action experts. This collective approach ensures that the training modules reflect both emerging industry trends and the cultural and environmental priorities of Canada's indigenous peoples, for instance by emphasising respect for the land and its ecosystems.

The faculty training modules have been published as open educational resources that are freely available for use and adaptation. This means that educators across Canada can repurpose the materials to enhance their existing curricula.

Image: Freepik.com

Being embedded in a single online publication (CICan, 2024), all training modules are preceded by a general introduction to sustainability, elaborating on themes such as biodiversity, carbon footprints, climate adaptation and circular economy. The introduction also discusses the concepts of indigenising and decolonising.

The faculty training modules function as interactive learning resources for instructors, containing a wide range of lessons based on text, images and videos, with some offering downloadable teaching materials for classroom activities. The module for carpentry instructors, for example, focuses on the sustainable management of waste from construction activities and the climate-conscious selection of building materials, while the electrical module examines energy efficiency and renewable energy, among other themes. While completing a module, educators are regularly prompted to reflect on what they are learning – for instance, in terms of how the insights they have acquired could be integrated into their teaching.

4.4 Integrating green skills into VET programmes

The integration of green skills into curricula and training programmes is a critical step in transforming the construction sector to meet sustainability goals. This transformation requires a workforce equipped with the competencies to adopt and implement sustainable practices and solutions. To achieve this, VET curricula must incorporate green and digital skills that align with industry demands and regulatory standards.

A key element in this process is the integration of green competencies into existing qualification frameworks. These competencies can be mapped using frameworks like ESCO (European Skills, Competences, Qualifications and Occupations), ensuring that training programmes are aligned with sector-specific requirements and the broader objectives of the European Green Deal (European Commission, 2024c). By mapping skills such as energy-efficiency, sustainable building materials, circular economy practices and green technologies to ESCO descriptors, VET providers can ensure that their curricula meet both current industry needs and future workforce requirements. This alignment ensures that learners develop competencies that are both relevant and recognised across European borders.

In addition, the Green Competence Framework (European Commission, 2022a) and the Digital Competence Framework (European Commission, 2022b) are invaluable tools for defining and integrating the specific skills required for the green and digital transitions. These frameworks highlight competencies in areas such as environmental impact assessment, resource efficiency, energy-efficient design, building information modelling and energy management systems. Integrating these competencies into VET curricula ensures that learners are equipped with both the technical expertise and digital literacy needed to meet the evolving demands of sustainable construction.

To effectively integrate these frameworks into VET programmes, a competence-based learning approach should be adopted, focusing on measurable outcomes and ensuring that learners can apply their green and digital skills in practical, real-world scenarios. Project-based learning methodologies, for instance, enable learners to work on sustainability assessments, energy-efficiency audits or green construction projects, fostering the practical application of the skills they acquire. These hands-on experiences enable learners to develop problem-solving abilities while directly contributing to sustainable construction practices.

A notable case in this context is the BuildSkills Academy, an international Erasmus+ project aiming to create a universal framework for VET providers enabling them to modernise their training content according to the industry needs and requirements of the green and digital transitions. BuildSkills aims to modernise training curricula, providing a universal framework that aligns with industry needs and the goals of the European Green Deal.

BuildSkills Academy – skill intelligence and training development for the twin transition in construction

Image: This_is_Engineering, Pixabay

The BuildSkills Academy (BSA) project, co-funded by Erasmus+, aims to transform VET for the green and digital transitions in construction (2023-2027). Coordinated by CleanTech Bulgaria, it unites 17 partners from 10 countries, including VET providers, industry groups, NGOs and universities. The BSA's goal is to create a pan-European framework for upskilling and certifying skills in the sector, targeting 100 VET providers and 1 000 companies for staff reskilling.

The Skills Gap Matrix is a tool designed to identify competency gaps in construction. Aligned with ESCO and the EQF, it maps green and digital skills across 38 occupations in five key areas: Net-Zero Carbon Emissions, Climate Resilience, Circular Economy, Sustainable Materials, and Occupant Health. This tool covers the full building lifecycle, providing comprehensive skills insight.

The Build Enriched Skills Methodology (BESM). helps VET providers upgrade courses for the green and digital transitions. It includes a self-assessment questionnaire, an automated gap analysis comparing courses to industry standards, and practical guidelines for improvement. Developed with input from experts, BESM was piloted on 12 courses and will be integrated into a digital platform for easy use (BSA, 2025).

4.5 Enhancing public-private partnerships in VET

Public-private partnerships (PPPs) are essential for ensuring that VET programmes remain relevant to the rapidly evolving needs of the workforce, especially in high-demand sectors like construction. These partnerships facilitate collaboration between public institutions, private companies and industry stakeholders to develop competence-based training pathways that address both current skill demands and future industry needs. This approach is fundamental to vocational excellence, ensuring that VET curricula are practical, forward-looking, and aligned with industry standards and technological innovations.

By engaging private sector players in the development of training programmes, CoVEs ensure that the workforce is equipped to address the emerging challenges of the industry, while providing sector-specific, targeted training that prepares learners for real-world applications.

A prime example of this collaboration is Construct2, a CoVE focused on strengthening public-private partnerships within the construction sector. Construct2 brings together industry experts and VET providers to co-develop training curricula that are aligned with the needs of both the current and future workforce. By leveraging a competence-based education approach, Construct2 ensures that learners are equipped with the specific, industry-relevant skills necessary for success in sustainable construction, digital innovation and environmental compliance.

Construct2, Georgia

Construct2 was established in 2017 through a collaboration between BK Construction and the Georgian Ministry of Education and Science to address the evolving needs of the construction sector by integrating sustainable practices into training programmes. By partnering with local construction companies and material suppliers, Construct2 ensures that its curriculum stays aligned with real-world industry demands and the latest green building techniques.

Over 200 VET teachers from across Georgia have benefited from hands-on training in sustainable construction methods and technologies, gaining valuable experience directly from industry experts. A standout example is the bricklaying course, which focuses on the use of aerated concrete blocks – one of Georgia's first courses to showcase sustainable building materials. Industry partners regularly provide demonstrations of eco-friendly materials and energy-efficient construction techniques, giving both teachers and students practical exposure to green technologies.

Image: Contruct2

Additionally, teachers take part in site visits to ongoing construction projects, including energy-efficient buildings and passive houses. These visits offer real-world context, deepening their understanding of sustainable building practices. Through these close ties with the construction industry, Construct2 keeps its training programmes relevant and up to date, preparing the next generation of construction workers with the skills needed for a sustainable building sector.

4.6 Expanding skills ecosystems – the role of social partners

Expanding the skills ecosystem to include diverse pathways for skill development – through industry partnerships, global collaborations and innovative initiatives – ensures that professionals are equipped with the knowledge and expertise needed for sustainable building practices. Social partners play a crucial role in shaping these pathways and fostering a collaborative environment that supports green construction.

The Serbia Green Building Council and the Global Alliance for Buildings and Construction (GlobalABC) Capacity Initiative offer valuable examples of how skills development in green construction can be advanced at both national and global levels.

While not typically associated with traditional vocational education and training (VET), these initiatives focus on fostering specialist skills for sustainable building practices. By creating alternative pathways for skill development, they align with the growing demand for eco-friendly construction and contribute to a dynamic, collaborative skills ecosystem. These initiatives illustrate how social partners – at both local and global scales – are key to building a skilled workforce capable of meeting the challenges of sustainable construction.

Serbia Green Building Council

The Serbia Green Building Council (SGBC) is a **social partner** that plays a central role in advancing sustainable building practices in Serbia. It works closely with governmental bodies, private companies and educational institutions to develop a skilled workforce aligned with international sustainability standards.

The SGBC focuses on education and professional development, offering specialist training for architects, engineers and construction workers in energy-efficient design, renewable energy, sustainable materials, and green certifications like LEED and BREEAM. These programmes combine theory with hands-on experience to prepare participants for green building practices.

The SGBC trains over 500 professionals each year, providing certifications aligned with local and international sustainability standards. It collaborates with Serbia's vocational education system, the University of Belgrade's Faculty of Architecture, and the Serbian Chamber of Engineers to integrate green building principles into curricula, preparing students for sustainable construction careers.

The SGBC also participates in global networks like the World Green Building Council (WGBC), enabling knowledge exchange and international collaboration on green building projects.

Global Alliance for Buildings and Construction

Established at COP28, the Global Alliance for Buildings and Construction (GlobalABC) brings together governments, industry leaders, international organisations and educational institutions to drive sustainable and energy-efficient construction. With a strong focus on policy development, knowledge exchange and skills training, it works to remove financial and technical barriers while ensuring that the workforce is equipped for a low-carbon future.

the GlobalABC Data Hub collects and analyses lifecycle data from buildings, providing essential insights for policymakers, investors and industry professionals. The Data Hub also integrates resources into the CAPSA Digital Building Passport Platform, ensuring informed decision-making for sustainable construction.

The Buildings Breakthrough initiative highlights capacity building and skills development as fundamental to achieving near-zero-emission and climate-resilient buildings by 2030. It includes creating partnerships between educational institutions, governments and the private sector to develop specialist training programmes. Additionally, it supports upskilling the existing workforce to transition to sustainable building practices, ensuring that the sector can meet ambitious climate targets.

Financial accessibility remains a major challenge, particularly in emerging markets where high upfront costs often deter investment in green technologies. To address this, GlobalABC collaborates with UNEP to mobilise funding and investment, combining government support, private sector engagement and industry expertise to facilitate the widespread adoption of sustainable solutions.

INSIDE-CoVE project – role of European Builders Confederation

The INSIDE-CoVE project, funded under the EU's Erasmus+ programme, exemplifies how CoVEs can foster social inclusion through green construction. The project spans six European countries – Belgium, Germany, Ireland, Greece, Spain and Cyprus – and brings together 26 partners from education, industry and research. The project focuses on building a diverse and skilled workforce for the construction sector, targeting youth, women, and other underrepresented groups. It integrates digital skills, energy efficiency and sustainable building practices into its training programmes, ensuring that non-traditional groups have access to emerging green careers. As a key partner, the European Builders Confederation (EBC) ensures that the voices of SMEs and craftspeople are included, aligning vocational training with the needs of small businesses and supporting a more innovative, sustainable and inclusive construction workforce.

4.7 Linking research, innovation and skills provision

To effectively green the construction sector and meet the challenges of sustainability, integrating research and innovation into VET is imperative. The sector's ongoing shift towards sustainable building technologies and circular economy principles demands a workforce equipped with the most up-to-date knowledge and practical skills. Research institutions, such as the Danish Technological Institute (DTI), are at the forefront of advancing these technologies, developing new materials and solutions that have the potential to significantly reduce the sector's carbon footprint. However, the successful adoption of these advancements relies heavily on the ability to transfer this research into training programmes that are closely aligned with the real-world demands of the industry.

The GreenFORCE project exemplifies how collaboration between research institutions and universities can drive innovation in the green construction sector. Coordinated by the Co-PLAN Institute in Albania, GreenFORCE focuses on sustainable construction technologies and energy-efficient solutions. Involving partners from the Western Balkans and the EU, it integrates cutting-edge research into practical, region-specific solutions.

GreenFORCE: fostering research excellence for the green transition in the Western Balkans

The GreenFORCE project, running from July 2022 to June 2025, is a transformative initiative designed to drive the green transition in the construction sector across the Western Balkans. Coordinated by the CO-PLAN Institute for Habitat Development in Albania, it brings together a consortium of key partners focused on advancing sustainability, energy efficiency, and innovative building practices in the region.

The project involves partners including the Center for Economic Analyses (CEA) from North Macedonia; the University of Belgrade's Faculty of Geography (UB-GEF), from Serbia; the Politecnico di Torino from Italy; and Nordregio from Sweden. These institutions are working collaboratively to develop cutting-edge research and technologies to tackle the key challenges of sustainable construction in the region. GreenFORCE is funded by the Horizon Europe programme, which supports international collaborations addressing societal challenges through research and innovation.

Tirana, Albania (Image: Seval Torun, Unsplash)

GreenFORCE places a strong emphasis on fostering research excellence in sustainable construction technologies. At its core, the project focuses on creating a Joint Research Agenda (JRA), which identifies and prioritises key research areas that align with the green transition goals for the Western Balkans. This framework targets crucial issues like energy efficiency, carbon emissions, and the adoption of sustainable building practices.

The project fosters collaboration and knowledge transfer between leading research institutions in the Western Balkans and EU Member States. Through joint research initiatives and expert exchange programmes, it ensures that the latest research and innovations are directly applied to the region's green transition.

GreenFORCE also offers training programmes to build local research capacity, improving the skills of scientists and engineers in sustainable construction methods.

Danish Technological Institute, Denmark

The Danish Technological Institute (DTI) is a leading research organisation with over 1 100 specialists, providing advanced knowledge in sustainable construction and energy efficiency. Its Building and Construction division and its Energy and Climate division focus on reducing the environmental impact of buildings throughout their lifecycle.

Image: DTI

The DTI's work includes improving the energy performance of buildings, developing low-carbon and sustainable materials, and promoting circular construction practices such as material reuse and waste reduction. The Institute also supports the adoption of smart technologies – such as sensors and automation – for optimising energy use and building management. Additionally, the DTI helps companies meet sustainability standards and certifications such as LEED and BREEAM.

To ensure that the construction workforce is prepared for the green transition, the DTI collaborates closely with VET providers and industry partners. This ensures that vocational training programmes reflect the latest innovations and equip learners with practical, up-to-date green skills.

4.8 Green finance and skills investment

The integration of funding and investment plays a key role in enabling CoVEs to support the green transition in sectors like construction. International financial institutions (IFIs), such as the European Bank for Reconstruction and Development (EBRD), are instrumental in financing large-scale, sustainable infrastructure projects. However, the success of these projects depends heavily on having a skilled workforce capable of implementing and maintaining energy-efficient technologies. This is where CoVEs become vital, as they serve as a bridge between industry needs and skills development, ensuring that workers are equipped to meet the challenges posed by green investments.

The finance and investment aspect is an integral part of the GRETA approach to greening excellence in CoVEs. The connection between vocational education and sustainable investment is central to creating a workforce that is not only capable of meeting the demands of green industries, but also poised to drive green growth and economic development. By embedding this funding and skills dimension into their strategies, CoVEs can contribute to a broader institutional approach to greening excellence, ensuring that sustainable development goals are met through the empowerment of skilled workers in the green economy.

IFIs often prioritise projects that require specialist skills, particularly in construction and energy-efficiency. As these institutions invest in sustainable projects, CoVEs have the opportunity to align their training programmes to provide the specific skills needed for green technologies and energy-efficient construction practices. This alignment is mutually beneficial: it strengthens the effectiveness of IFI-backed investments by ensuring a qualified workforce, while also enhancing the relevance of CoVEs' training programmes. By meeting industry demands, CoVEs improve their ability to prepare workers for emerging job opportunities, creating a positive feedback loop that supports both the green economy and the development of a skilled workforce.

The Vojvodina Public Buildings Energy Efficiency Programme is a significant step towards reducing energy consumption and greenhouse gas emissions in Serbia's public sector. By improving the energy performance of key public buildings and investing in the development of technical skills, the project not only contributes to environmental sustainability, but also enhances the capacity of the local workforce to support Serbia's green transition.

Similarly, the Sarajevo Public Buildings Energy Efficiency Project has played a key role in bridging the skills gap in the energy sector by providing targeted training programmes and capacity-building activities. By equipping local professionals with the necessary skills and knowledge, the project has enhanced the sustainability of energy-efficiency initiatives and fostered a culture of energy-consciousness within public institutions.

Vojvodina Public Buildings Energy Efficiency Programme

The European Bank for Reconstruction and Development (EBRD) is financing a comprehensive energy efficiency initiative in the Autonomous Province of Vojvodina, Serbia. Launched in 2023, this project aims to retrofit 80 public buildings across 20 municipalities, including schools, healthcare facilities, and administrative offices. The total investment amounts to EUR 14 million, comprising a EUR 12 million loan from the EBRD and a EUR 2 million grant from the European Union.

The initiative aims to establish sustainable financing mechanisms for future energy-efficiency projects in Vojvodina. By demonstrating the viability and benefits of energy-efficient renovations, the project seeks to encourage continued investment in the region's public infrastructure. It focuses on improving energy-efficiency in public buildings by upgrading insulation, windows, HVAC systems and lighting, aiming for around a 50% reduction in energy use and CO_2 emissions. It also supports local training for workers and engineers to ensure proper implementation and long-term impact. Additionally, it promotes sustainable financing to help fund future energy-saving projects in Vojvodina.

More information can be found on the EBRD website.

Sarajevo Public Buildings Energy Efficiency Project

The Sarajevo Public Buildings Energy Efficiency Project is a collaborative initiative between the European Bank for Reconstruction and Development (EBRD), the European Union (EU) and the Government of Austria, aimed at enhancing the energy efficiency of public buildings in Sarajevo Canton.

Image: Workman Kapotnya, Unsplash.com

Launched in 2023, the project focuses on retrofitting and renovating 40 public buildings, including kindergartens, high schools, student dormitories and health centres, to improve their energy performance and reduce greenhouse gas emissions. The total investment amounts to EUR 10 million, comprising a EUR 8 million loan from the EBRD and a EUR 2 million grant from the EU.

The project assists environmental funds in developing financial mechanisms, such as revolving funds and energy service company (ESCO) funds, to finance energy-efficiency projects. These mechanisms aim to provide sustainable funding sources for energy-saving initiatives in public buildings.

A central component of the project is the development of technical skills among local professionals to support the implementation and maintenance of energy-efficient measures in public buildings. The project focuses on enhancing the capacities of various stakeholders, including municipal authorities, public facility managers and utility companies, to effectively manage energy consumption and implement energy-saving measures.

The practice examples above demonstrate various ongoing efforts to promote skill provision for a green and just transition in the construction sector. However, this transition is a complex and extensive process calling for further initiatives and joint efforts by all stakeholders involved, including those engaged in strengthening VET systems and skills delivery. With this in mind, the next – and concluding – section of this paper presents policy recommendations on how to foster vocational excellence and high-quality skill provision for building green.

5. POLICY RECOMMENDATIONS FOR VOCATIONAL EXCELLENCE IN GREEN CONSTRUCTION

Key message

Accelerating vocational excellence requires both strong direction and enabling forces – effective governance, strategic leadership, continuous quality improvement and stable funding. These elements create momentum for centres of vocational excellence (CoVEs) to drive innovation, collaboration and green skills development, supporting a sustainable and inclusive construction sector.

The 11 recommendations provided to support this acceleration are:

1. National VET reforms
   Grant CoVEs greater managerial autonomy to collaborate with private sector partners, supported by accountability frameworks.
2. Skills ecosystems and governance
   Build integrated skills ecosystems around CoVEs with shared governance by industry, government and educators to align training with regional goals.
3. Learning design: mobility and work-based learning
   Strengthen partnerships between VET and construction companies to expand work-based learning focused on green technologies and sustainability.
4. Career guidance and sector attractiveness
   Promote green construction careers through targeted outreach involving schools, training providers, employment services and industry, especially for underrepresented groups.
5. Green and digital curriculum upgrades
   Integrate sustainability and digital skills (e.g. BIM, energy systems) into VET curricula using labour market intelligence.
6. Upskilling and reskilling for green transitions
   Offer flexible, modular training for all adults in digital and sustainable construction, based on industry standards and skills intelligence, with recognition of prior learning.
7. Teacher professional development
   Provide ongoing training for VET teachers in green construction practices and experiential teaching methods.
8. Strategic R&I in construction
   Establish R&I partnerships between CoVEs and research institutions to integrate advanced sustainability through applied research and technology transfer.
9. Financing mechanisms
   Develop sustainable funding streams through public-private partnerships, skills levies and tax incentives for green VET investment.
10. Internationalising VET excellence
    Align with global quality frameworks and promote mobility, networks and the integration of green and inclusive skills into training.
11. Data-driven CoVE development
    Apply outcome-based metrics and skills forecasting to guide CoVE activities and ensure alignment with evolving industry needs.

CoVEs represent a transformational shift in how we conceptualise skills development for the green transition. Rather than relying on traditional training models, CoVEs adopt an integrated, place-based ecosystem approach. This enables them to function as innovation hubs through a collaborative approach. They function as innovation hubs, fostering collaboration across a wide network of partners. In this role, CoVEs are more than training providers: they co-create tailored solutions that reflect the specific socio-economic realities of their local environments. In doing so, reskilling and upskilling for the green transition become powerful drivers of regional economic development and inclusive innovation.

The concept of acceleration offers a powerful metaphor for understanding how to drive forward vocational excellence in green construction. Just as acceleration in physics is a vector requiring both force and direction, vocational excellence depends on a combination of strategic and systemic enablers. This includes a governance framework that supports an ecosystem approach, strong strategic direction and leadership, and a culture of quality assurance and continuous learning. These elements must be reinforced by a conducive policy environment, marked by effective policy coordination and a stable funding framework. Together, they create the momentum needed to accelerate transformation in vocational education for the green transition.

The decarbonisation of the construction sector is an essential prerequisite for addressing climate change and environmental degradation. The sector and its value chain include all the economic activities related to the planning, design, building, maintenance, renovation and deconstruction of buildings and infrastructure. It is one of the largest contributors to greenhouse gas emissions, resource consumption and biodiversity loss, and the sector plays a critical role in the transition to a sustainable economy. Achieving this transformation requires the widespread deployment of innovative green technologies and the integration of circular economy principles throughout the construction value chain. Decarbonising the construction sector is essential to addressing climate change and environmental degradation, given its substantial impact on greenhouse gas emissions, resource consumption and biodiversity loss. Embracing green technologies and circular practices is therefore critical not only for meeting global climate goals, but also for advancing sustainable development.

The success of this transition depends on equipping workers – at every stage of the construction value chain – with the green skills, knowledge and values needed to adapt to new demands. This is not only key to fully harnessing job creation associated with the green transition, but it also mitigates potential job losses associated with the green transition, and hence it is a precondition to inclusive green transformation of economies.

The following 11 policy recommendations outline concrete actions to accelerate vocational excellence and drive systemic change in the green construction sector. These recommendations acknowledge the diversity of contexts across regions, building on insights from the GRETA initiative and research on vocational excellence. The recommendations are structured according to key dimensions of vocational excellence illustrated in the model below.

Figure 2: Key dimensions of vocational excellence

Source: Authors' elaboration based on ISATCOVE.

5.1 National VET reforms

Recommendation

Grant CoVEs greater managerial autonomy by law to collaborate effectively with private sector partners while establishing accountability frameworks to ensure responsible decision-making.

The advancement of vocational excellence in green construction requires a fundamental reconsideration of how VET systems are governed. The green transition in construction necessitates a systemic transformation in how the built environment is designed, constructed, maintained and repurposed. This transformation calls for a governance model that dismantles existing silos between education, labour market, environmental and innovation policies, ensuring coherence with broader sustainability and industrial strategies in the medium term.

Environmental and innovation policies can play a key role in shaping demand for green skills, particularly through standardisation and regulatory requirements across the construction value chain, from design and planning to demolition and recycling. However, fully capitalising on these opportunities requires anticipatory governance that actively involves a broad and diverse group of stakeholders. This is especially important given the fragmented and loosely coupled nature of the construction value chain, which involves a wide array of stakeholders, including micro-enterprises in some regions' informal economies.

International experience highlights the importance of granting CoVEs sufficient autonomy to operate effectively. Autonomy allows CoVEs to respond swiftly to the needs of industry partners – whether through hiring staff, investing in cutting-edge equipment, supporting the development and uptake of new green materials and technologies, or addressing emerging skill demands. In complex and fast-evolving national systems, responsiveness is essential, as localised needs often differ substantially.

The agility and innovation capacity of CoVEs are crucial in enabling them to serve as dynamic hubs within increasingly complex skills ecosystems. With the right level of autonomy, CoVEs can pioneer new training models, pilot interdisciplinary programmes, act as demonstration centres for green technologies facilitating technology transfer especially to SMEs, and develop innovative pedagogies that empower apprentices to function as innovation agents within the green transition.

This capacity for innovation is vital for fostering excellence in green construction, where new standards, materials and methods are continuously emerging. These rapid developments make the role of CoVEs critical in bridging knowledge and practice. Experience shows that public-private partnership governance models for CoVEs may be organised in different ways, and they typically evolve over time as trust is built and partnership models expand (European Training Foundation, 2023).

National policy reforms should aim to strike the right balance between governance and decision-making at national, regional and local levels. While local autonomy ensures responsiveness and innovation, national-level governance provides the overarching frameworks, quality standards and funding mechanisms needed to scale effective practices and maintain alignment with broader economic, industrial and sustainability objectives (European Training Foundation, 2021).

Over time, CoVEs evolve into nodes of innovation that have a systemic impact across regions and sectors. Their experiences in exercising autonomy within public-private partnerships offer valuable insights for the future of VET policy and practice. These models of excellence can be further strengthened through international collaboration, including staff and student exchanges.

To advance vocational excellence, national VET reforms must focus on creating systemic conditions that allow CoVEs and wider VET ecosystems to thrive. Specifically, national reforms should prioritise:

- positioning CoVEs as strategic players within regional development and innovation ecosystems, aligning VET with smart specialisation strategies and the twin green and digital transitions;
- promoting inclusive, multi-level governance models that engage diverse stakeholders in co-designing policies, curricula and learning pathways;
- multi-level governance, which evidence shows is linked to increased effectiveness, efficiency, coherence, transparency, accountability and performance in VET systems, ensuring that reforms are demand-driven and forward-looking; and
- supporting strong quality assurance cultures, shared outcome-based metrics, and stable, long-term funding mechanisms to reinforce performance-driven, autonomous CoVEs.

From a policy perspective, VET excellence in construction means building ecosystems rather than acting in isolation. CoVEs act as platforms for active cooperation between VET providers, universities, employers, social partners, public agencies and civil society, facilitating co-creation and green tech diffusion.

This ecosystem approach is particularly critical in construction, which faces greater challenges in innovation diffusion and scaling best practices due to its loosely coupled value chain – challenges that affect productivity, sustainability practices and employment quality.

5.2 Skills ecosystems – vision and multi-level governance

Recommendation

Develop integrated dynamic skills ecosystems centred around CoVEs, governed by shared responsibility among stakeholders, including industry, government and educational institutions, to align training with regional economic and environmental priorities.

Accelerating vocational excellence requires a shift from isolated training institutions to integrated skills ecosystems where CoVEs serve as central nodes. This means that they are place-based and embedded within local innovation, production systems and governance structures through the configuration and collaboration of training providers, enterprises, social partners, regional authorities and other stakeholders.

Skills ecosystems enable approaches that are:

- demand-driven and context sensitive (responding to real labour market and economic needs and opportunities);
- inclusive (involving diverse stakeholders and promoting upskilling and reskilling that mitigate the job destruction effects of greening in the construction sector and create new and better job opportunities through upskilling and reskilling);
- adaptive and resilient (able to effectively respond to technological, economic and societal change associated with the green transition); and
- innovative (fostering economic development, innovation and inclusion in economic activity).

To enable skills ecosystems to thrive, governance must be anchored in a shared vision that aligns education, training and lifelong learning objectives with regional economic transformation, environmental goals such as NDCs and the SDGs, and innovation agendas.

Skills ecosystems imply that vocational excellence emerges not from isolated institutions but from well-orchestrated collaboration across the entire skills ecosystem, though experiences show that the

actual governance model may vary, and it typically evolves over time as the partnership matures and expands (European Training Foundation, 2023).

To foster active collaboration around activities of shared value, the governance of these ecosystems should be structured based on principles of shared responsibility, with clear roles for each stakeholder group and enabled by a shared vision and a long-term strategy to fully draw on the expertise and insights of all partners (European Training Foundation, 2021). This entails not only the consultative involvement of partners in CoVEs, but also active participation by stakeholders at all stages of a policy and planning cycle, drawing on the strengths of each partner. Industry partners should provide insights into skill needs and technological trends, regional authorities can provide insights into upcoming regulations or inward investments that will have an impact on skills demands, while social partners can play a key role in defining skills standards emerging across the value chain, which in turn allow training institutions to offer responsive training programmes.

To inform strategy and targets, studies can be conducted to systematically identify economic strengths, labour market trends and relevant policy developments – such as emerging environmental regulations and standardisation efforts, which may influence future skills needs quantitatively and qualitatively. These insights can help anticipate emerging skills gaps, address potential job destruction effects of the green ttransition n, and identify new job opportunities across specific value chains, such as in the construction sector.

As mentioned, government agencies play a critical enabling role – not only by establishing robust funding frameworks, but also through coordinated policy approaches that position CoVEs not merely through their provision of a skilled labour force, but as catalysts of smart specialisation, technology diffusion, and green and digital transformation in construction and across sectors of the economy.

As such, CoVEs are a broader concept of VET excellence that go far beyond traditional training provision. They are understood as strategic hubs and accelerators of innovation within skills ecosystems and modes of operation (European Commission , 2022).

5.3 Design for learning work-based and work-placed learning

Recommendation

Strengthen partnerships between VET institutions and construction companies to provide work-based learning opportunities, such as apprenticeships, internships and job-placement schemes, focused on green construction technologies and sustainability challenges.

Work-based and work-placed learning are core components of effective vocational education in green construction, providing learners in VET programmes or in continuing training with authentic experiences that bridge general knowledge and with practical application. They also enable learners to acquire employability skills and competences that can be difficult to obtain in a traditional school setting. This approach recognises that the complex composition of sustainable construction skills cannot be developed solely in classroom settings, but must be cultivated through direct engagement with real-world challenges and the deployment of green materials and technologies. CoVEs are ideally situated to offer both work-based and work-placed learning opportunities, both for youth enrolling in a construction VET programme and for individual adult learners or companies that need to upskill or reskill for green construction. As the construction sector is in a transitional phase, and also counts many micro-companies in its ranks, it can be difficult for a specific company to cover the full set of green skills and processes associated with a particular occupation. These limitations can potentially be overcome by companies sharing an apprentice or trainee, or if the CoVE – for example, through its collaboration with suppliers to the construction value chain – can offer an authentic learning

environment at the school premises for prominent practices and technologies. The use of software simulations and virtual reality may also potentially be considered.

While work-based and work-placed learning share common features, they differ significantly in structure and legal status. These differences exist along a spectrum of arrangements. At one end are formal apprenticeships, where learners are legally employed, receive wages and hold employment contracts. In these arrangements, a substantial component of learning occurs on company premises, often guided by designated in-company trainers. At the other end is unstructured work-placed learning, such as job shadowing, which is designed primarily to introduce individuals to workplace environments. Between these extremes, work-based learning may occur in workshop settings at school premises, offering practical experience without full workplace immersion.

Modern work-based learning also incorporates simulated workplace environments using digital tools, such as virtual reality applications that allow students to practise safety procedures in realistic work-site scenarios without physical risk. These technological approaches bridge the gap between classroom theory and workplace application while providing safe learning environments for high-risk skills development. The varying structures create different learning experiences, each with distinct advantages for skills development and workplace integration.

These modes exist along a continuum with varying degrees of employer and social partner involvement, governance models, duration, assessment methods and financing arrangements. The choice of model depends on specific objectives, such as developing vocational skills, building employability skills, informing career choices, or facilitating employment for disadvantaged individuals (European Training Foundation, 2018).

To maximise the effectiveness of work-based and work-placed learning, CoVEs should establish formal mechanisms for ongoing dialogue with industry partners to ensure that training content remains aligned with evolving green construction practices. This includes regularly reviewing frameworks, developing shared assessment criteria for learning outcomes pertaining to green skills, and creating feedback loops that enable workplace experiences to inform curriculum development and pedagogical practices.

5.4 Education and career guidance, and the attractiveness of education and training in the construction sector

Recommendation

Enhance the visibility of green construction careers by collaborating with education and training providers, the primary and lower secondary school sector, employment services and industry to provide targeted career guidance and outreach to underrepresented groups, such as women and migrants.

Addressing the green skills gap in construction requires not only developing appropriate training programmes, but also attracting new talent to the sector. CoVEs play a crucial role in this process by enhancing the visibility and appeal of green construction careers through targeted career guidance initiatives.

In the context of green construction, education and career guidance should highlight how upskilling, reskilling and environmentally focused training programmes serve a dual purpose. They not only reduce the environmental impact, but also create attractive job and career pathway opportunities for learners and potential employees.

CoVEs should collaborate with schools, employment services and industry partners to deliver comprehensive and accessible information about jobs and careers in green construction. This should

include insights into skill requirements, working conditions, career progression pathways, and the sector's wider contribution to sustainability and climate action.

Tailored formats should be developed to meet the needs of diverse audiences, including young people, career changers and vulnerable groups. These efforts are essential not only for informed career planning, but also for improving the overall attractiveness of the construction sector in a green economy. To enhance the appeal of construction education, CoVEs should showcase innovative training approaches and state-of-the-art facilities that prepare students for the green transition. This can be achieved through a living lab format, where different learner groups can gain hands-on experience in authentic settings, seeing first-hand how training programmes incorporate cutting-edge technologies and sustainable building practices. Such demonstrations help shift perceptions beyond traditional views of the construction industry.

Targeted outreach to underrepresented groups is essential for addressing skills shortages and promoting social inclusion. By developing tailored recruitment strategies, which embed career guidance, tailored pathways to employment and earning, and employment matching services, CoVEs can reach non-traditional and vulnerable groups and help diversify the construction workforce while addressing critical skills gaps.

Industry involvement in career guidance activities adds credibility and provides students and adult learners with authentic insights into workplace realities. In addition to a living lab offer, this may include site visits, guest lectures from industry professionals, job shadowing opportunities, and mentorship programmes that connect learners with experienced practitioners in green construction. This facilitates transition to employment in the construction sector in particular because the construction value chain is often dominated by SMEs, which typically do not have formalised HR practices.

5.5 Greening and upgrading curricula for digital skills

Recommendation

Redesign VET curricula to fully integrate sustainability and digital competencies, including skills in building information modelling (BIM) and energy management systems, to prepare the workforce for the green and digital transitions by drawing on robust skills intelligence.

Integrating sustainability competencies into VET learning outcomes and curriculum frameworks is a critical enabler for accelerating vocational excellence in the green construction sector and value chain. This is not merely a question of adding environmental content to existing courses. More fundamentally, it concerns how we conceptualise the greening of the construction sector and its value chain and how that is translated into skills requirements. One of the key challenges in assessing skills for the green transition lies in clearly defining what qualifies as a 'green' skill – an issue closely linked to the broader difficulty of classifying green jobs. Green jobs span a wide range of sectors and occupations, and are far from uniform in their skill requirements. They can demand anything from low to high qualifications and involve diverse skill sets. Therefore, focusing solely on green jobs can obscure important differences. To better understand the evolving demands of the green economy, it is essential to shift the emphasis from jobs to the underlying skills. A skills-based approach allows for a more granular analysis of the complex and varied dynamics driving the green transition (OECD, 2023).

The EU's Green Deal emphasises environmental sustainability in vocational education and training, calling for collaboration with industry to identify and integrate both sector-specific and cross-sectoral green skills into VET curricula. This means, as mentioned previously, that programmes need to be 'greened' to incorporate climate change awareness, green technologies, energy efficiency, circular

economy principles and sustainable practices, supported by appropriate pedagogical methods that foster environmental consciousness.

This systemic approach recognises that sustainability is not merely an add-on to existing curricula, but necessitates a transformation of how we conceptualise vocational competencies. Conceptual frameworks such as the EU's ESCO classification system offer a foundation that could be adapted specifically to mapping green construction skills, working as a dictionary, describing, identifying and classifying professional occupations and skills relevant for the EU labour market and education and training through a common language. Initiatives such as the BuildSkills Academy (see Section 4) and the Construction Blueprint (and its Construction Skills Observatory) provide valuable mappings of skill needs in construction that can serve as references for national curriculum development.

Another recommended action is to integrate green skills measures in the forthcoming Nationally Determined Contributions (NDCs 3.0) by each country under the Paris Agreement (United Nations Climate Change, 2025). Countries should leverage the NDC development process to conduct comprehensive sectoral skills foresight for the construction industry, examining different occupational fields and their required competencies. This assessment should encompass green building design professionals (architects and engineers), sustainable materials specialists (suppliers and producers) and energy-efficiency practitioners (planners, electricians, plumbers and technicians).

NDC implementation plans should include quantifiable training targets that directly support climate goals. For instance, countries might commit to 'train and certify 500 000 workers in green building techniques by 2030' or 'integrate energy-efficiency modules into 80% of vocational training programmes in the construction sector'. Additionally, developing micro-credential pathways for digitisation skills (such as building information modelling and Internet of Things applications in smart buildings) can facilitate targeted upskilling. Dedicated retrofitting training pathways can simultaneously address climate objectives and combat unemployment.

Digital skills must be integrated alongside green competencies, reflecting the growing convergence of sustainability and digitisation in modern construction practices. Key green competencies include energy-efficient design and retrofitting knowledge (passive house principles, renewable energy systems and energy modelling), expertise in sustainable materials (selecting and applying eco-friendly materials like low-carbon concrete and reclaimed wood), and proficiency in green technology integration (installing and maintaining technologies such as solar panels, geothermal heating systems and smart energy management solutions).

Essential digital tools complement these green skills, including building information modelling for creating detailed 3D models that facilitate energy simulations and sustainability assessments; energy modelling software for analysing and optimising building energy consumption; smart construction technologies for managing IoT-enabled devices that monitor energy use and environmental performance in real time; and data analysis capabilities to inform sustainable decision-making throughout construction projects.

Moreover, sustainable construction practices call for new soft skills to support the ability to collaborate, innovate and problem-solve. These demands are further compounded by regional and international sustainability standards, such as LEED certification and BREEAM guidelines, which mandate compliance with environmentally friendly construction practices.

5.6 Upskilling and reskilling for evolving labour markets

Recommendation

Develop flexible, modular training programmes for all adults – both employed and unemployed – focused on digital tools and sustainable construction practices. These targeted upskilling and reskilling opportunities will prepare the workforce for the green transition in construction. Training programmes should be based on reliable skills intelligence, aligned with industry-established standards and built around coherent pathways that recognise prior learning (RPL); and allow for an integration of formal, informal and nonformal learning).

Providing workers with upskilling or reskilling offers can ease movement between jobs from spells of employment and support transitions as the construction sector is transforming. It also enhances workers' capacity to adopt, adapt and further develop green technologies, materials and sustainable building practices. Innovations throughout the value chain can lead to productivity gains and improve job quality and earnings, not least for those employed in micro-enterprises, which in some regions are predominantly part of the informal economy.

Upskilling and reskilling provision should be designed with the specific constraints and motivations of working professionals in mind. Micro-credentials are particularly suitable as they offer the potential to better connect informal, non-formal and formal learning in personalised and flexible industry-relevant pathways. This includes offering flexible delivery formats (evening courses, weekend workshops, online modules), and support services that consider the diverse needs of adults.

Many adults working in the construction sector may not have obtained any formal qualifications, but they may still possess a range of relevant skills. Policies and practices for the recognition of prior learning (RPL) and experience are therefore critical to inclusive upskilling and reskilling practices in the construction sector.

CoVEs are uniquely positioned to deliver inclusive upskilling and reskilling opportunities, thanks to their close collaboration with employers, social partners, and public institutions such as employment services. This collaborative model enables integrated 'learning and earning' pathways – starting from tailored career guidance, RPL (validation and recognition of prior learning) and other support services to training aligned with real labour market demand. It also allows for customised approaches that combine workplace-based learning with matching services, particularly benefiting vulnerable groups.

Upskilling and reskilling offers should be informed by state-of-the-art skills intelligence and aligned with emerging standards and regulatory requirements across the construction value chain. For professionals who already hold formal qualifications, targeted short courses and certifications are essential to remain up to date with advances in green technologies, materials and sustainable processes.

For individuals who have low qualifications or are long-term unemployed, modular training pathways that integrate both technical and general skills offer a more accessible route to sustainable employment. These programmes should be flexible and outcome-oriented, with granular, evidence-based quality assurance systems to monitor relevance, effectiveness and cost-efficiency.

As part of their strategic development, CoVEs should explore integrating internationally recognised certifications such as LEED, BREEAM, EDGE and WELL, as well as digital certifications in areas like the Internet of Things (IoT) and building information modelling linked to specific occupational roles. These certifications align training with real market needs, including large-scale infrastructure projects supported by inward investment. They build on widely accepted international standards, enhancing cross-border recognition and labour mobility, while reducing skills mismatches and closing gaps in emerging green sectors; this is particularly valuable in transition economies.

Furthermore, CoVEs could license and adapt training materials developed through international initiatives, such as the Sectoral Skills Alliance led by the European Institute of Innovation and Technology (EIT), or from other leading international CoVEs focused on the construction value chain. This approach can accelerate the adoption of best practices, promote technology transfer, and foster international cooperation in innovation and training delivery.

5.7 Teachers' professional development

Recommendation

Develop continuous professional development programmes for VET teachers and trainers, ensuring that they stay updated on green construction practices and adopt experiential teaching methodologies.

The successful implementation of green construction training depends critically on the knowledge, skills and attitudes of VET teachers and trainers. As green building practices and technologies constantly evolve, educators require regular professional development to stay current with industry developments and effective teaching methodologies.

VET institutions should facilitate opportunities for teachers to gain practical, hands-on experience in green construction by partnering with companies. This can include industry-led workshops, site visits, and temporary placements within construction companies. Such experiences enable teachers to develop an authentic understanding of current practices that they can then incorporate into their teaching.

Sector-specific training forms the foundation of effective teacher development, with educators receiving regular, targeted instruction on emerging green construction technologies, materials and methods. This includes training on energy-efficient building systems, circular economy principles and digital tools. Complementing theoretical knowledge, short-term industry placements in leading green construction companies ensure that teachers gain practical, up-to-date industry insights. For example, the French CoVE La Maison Passive provides targeted teacher training on passive house construction, integrating real-world industry experiences and hands-on technical training, ensuring that educators remain at the forefront of sustainable building practices.

Modular training pathways through micro-credentials and certifications allow teachers to gain specialist skills quickly, reflecting the rapid evolution of the sector. The work of Colleges and Institutes Canada (CICan) exemplifies this approach through its faculty training modules specifically designed for trades instructors. CICan has published comprehensive professional development modules covering key construction areas including carpentry, electrical installations, landscaping and HVACR (heating, ventilation, air conditioning and refrigeration).

Integrating digital tools is essential, with teachers receiving training in digital construction technologies such as BIM, digital twins and IoT systems, which are fundamental for sustainable building design and management. This can be achieved through virtual simulations and digital labs that complement hands-on training. The German CoVE Bau-ABC Rostrup demonstrates this approach by integrating digital tools like 3D modelling, augmented reality and smart construction technologies into its teacher training programmes, enhancing the digital competencies required for modern green construction.

Providing financial and institutional support for ongoing teacher training, including allocated time for professional development, is crucial for sustainable implementation. Additionally, recognising continuous learning and industry engagement as part of career progression for VET teachers creates incentive structures that encourage ongoing professional growth.

5.8 Advancing construction through strategic research and innovation partnerships

Recommendation

Forge strategic partnerships between CoVEs and research institutions, building on knowledge triangles enabling technology and knowledge transfer by integrating advanced sustainability practices into vocational training. This may occur through collaborative applied research, innovation hubs or technology transfer services, ensuring that construction education remains aligned with industry advancements.

To ensure that vocational training in green construction remains at the cutting edge of sustainability practices, strong CoVE partnerships should also involve research institutions, universities and industry players, forming a robust knowledge triangle within the construction value chain. These partnerships enable a continuous, interactive flow of knowledge and technology transfer, connecting theoretical insights from research with practical, real-world applications and nurturing a dynamic and adaptive skills ecosystem. This not only ensures that the training offer and other CoVE activities rest on the latest innovations in sustainable building materials, energy-efficient systems and sustainable construction practices, but also creates positive spillover effects. By enhancing the density of regional innovation ecosystems, this approach accelerates the green transition within the construction value chain and contributes to the broader transformation toward a sustainable economy.

The Basque VET Applied Research Centre, Tknika, demonstrates how CoVEs can become strategic accelerators of regional innovation and smart specialisation. Developed under the leadership of the Basque government, Tknika goes beyond traditional vocational training by embedding applied research, industry partnerships and educational innovation into its core activities. It actively aligns the VET ecosystem with regional economic transformation priorities.

At its core, Tknika practices industry-driven curriculum co-design, bringing together construction companies, green technology providers and public authorities to develop VET curricula that integrate energy-efficient building methods, sustainable materials, digital skills and life cycle assessment techniques. This ensures that training remains responsive to emerging technologies and sustainability standards.

Beyond education, Tknika offers business incubation and SME support, providing access to testing facilities, coaching on green certification standards, and assistance with EU funding programmes. This accelerates the commercialisation of sustainable innovations and stimulates local green job creation.

Tknika's effectiveness is reinforced by its multi-stakeholder governance structure, including VET providers, industry representatives, research institutions and local authorities. This ensures alignment with regional development goals and innovation policies.

Applying this model to the construction sector creates significant opportunities for addressing key challenges. It enables deeper value chain integration through strategic partnerships with clearly defined roles that provide business value for all participants.

5.9 Financing mechanisms

Recommendation

Establish sustainable funding streams for CoVEs, including innovative public-private partnerships, sectoral skills levies, and tax incentives for companies investing in green VET activities.

To effectively support the green transition, national governments can establish dedicated, stable funding streams that provide long-term support for both infrastructure and workforce development. France provides a leading example through its France Relance recovery plan, launched in 2020, which allocated EUR 100 billion across key areas, including EUR 30 billion for ecological transformation. Within this framework, EUR 1.6 billion was specifically earmarked for vocational training in sectors critical to the green transition, including construction. Importantly, the plan climat-air-énergie territorial (PCAET) framework allows regional authorities to tailor national funding to local labour market needs, ensuring that national investments are effectively translated into regional workforce development.

Another way to establish sustainable funding streams for CoVEs is through innovative public-private partnerships, sectoral skills levies, and tax incentives for companies investing in green VET activities. A coordinated, multi-layered approach is essential – one that integrates direct public funding, private co-investment, sector-specific grants and innovative financial instruments. By embedding upskilling and reskilling within the broader policy framework and funding base for the green transition, it is possible to achieve green skills development at sufficient scale.

Legal and financial frameworks enabling the joint operation of specialist training centres through public-private partnerships are innovative governance models that combine public education missions with private sector management approaches. For instance, the Training Institute for Renewable Energy and Energy Efficiency (IFMEREE) in Morocco is run in collaboration between public and private partners. The training centre operates in the national public education system and its education is free for students. However, the day-to-day management of IFMEREE is delegated to a public limited company with a supervisory board primarily representing private sector stakeholders. The IFMEREE model demonstrates how hybrid organisational structures can leverage the strengths of both sectors.

Modernised sectoral training levy systems specifically supporting green skills development, as implemented by the UK's Construction Industry Training Board, demonstrate how industry-wide funding mechanisms can be redirected toward strategic priorities like sustainability. By reforming levy allocation formulas to prioritise training in sustainable construction methods, these systems create collective financing mechanisms that overcome individual firms' reluctance to invest in transferable skills.

Green training requirements in public construction contracts are a powerful policy lever that links procurement to skills development. Belgium's Employment-Environment Alliance illustrates how public spending can create market incentives for workforce development, requiring contractors on public projects to provide apprenticeship positions focused on sustainable building methods. This approach recognises that governments can use their purchasing power to drive educational innovation and labour market transformation simultaneously.

Blended finance instruments combining concessional funding with private investment demonstrate innovative approaches to educational financing that leverage limited public resources. As an example, The African Development Bank (AfDB), in collaboration with Invest in Africa, initiated the MicroGREEN project to empower marginalised groups through micro-entrepreneurship in green jobs. With a USD 1 million grant from the AfDB's Youth Entrepreneurship and Innovation Multi-Donor Trust Fund, the project aims to generate up to 500 green job opportunities. It employs a value chain-based

approach, engaging private sector partners to provide business development services, thereby ensuring the project's sustainability beyond public funding.

The examples above shows that the integration of VET capacity building into climate finance frameworks represents a conceptual shift in how we understand the relationship between education and environmental action, and in that respect how alignment between policy areas can accelerate the green transition. In fact, the World Bank's incorporation of construction skills development provisions into climate investment funds illustrates explicit policy efforts to overcoming technical capacity constraints that often limit the implementation of funded green projects. Moreover, the examples illustrate that financing green transition in construction requires a coordinated, multi-layered approach that integrates direct public funding, private co-investment, sector-specific grants and innovative financial instruments.

5.10 Internationalising vocational excellence

Recommendation

Adopt global quality frameworks like EQAVET, and align qualifications with the EQF for skills recognition and portability. Promote international networks and mobility programmes to boost knowledge exchange and intercultural skills. Integrate green skills and inclusion into training to support a sustainable, equitable construction workforce.

The internationalisation of vocational excellence marks a fundamental shift from nationally confined VET systems towards globally connected learning ecosystems. These networks reflect the realities of increasingly globalised value chains, even in sectors like construction, where multinational firms operate across borders.

CoVEs serve as strategic platforms for international cooperation, fostering shared learning, innovation, and the co-development of solutions to common challenges such as climate change and technological transformation that transcend national boundaries. By facilitating knowledge exchange and joint initiatives, international collaboration through CoVEs helps accelerate the uptake of effective practices in green construction training, technology transfer and innovation, while promoting alignment on standards and preventing costly duplication of efforts.

To support this transformation, policy should deploy benchmarks of international standards and best practices to guide policy reform. A key priority is the development of internationally recognised quality assurance frameworks, competence and learning-outcome-based approaches resting on qualifications frameworks. When this is underpinned by outcome metrics such as transition to labour markets to skilled employment, qualifications can be compared against one another, and are thus conducive to trust and portability across borders.

This involves adopting frameworks such as European Quality Assurance in Vocational Education and Training (EQAVET), which provides a structured model for planning, implementation, evaluation and continuous improvement in VET delivery. Through EQAVET, countries can use a shared set of indicators and descriptors to assess and raise the quality of their vocational education systems (European Commission , 2025). Similarly, international standards like ISO 21001, developed by the International Organization for Standardization (ISO), offer a management system tailored specifically to educational organisations. This standard emphasises learner-centred practices, stakeholder engagement and data-driven quality enhancement.

In practice, aligning with these benchmarks involves incorporating standardised learning outcomes into national qualifications frameworks and mapping them to broader international frameworks like the European Qualifications Framework (EQF). This alignment facilitates the mutual recognition of

qualifications, allowing diplomas or certificates earned in one country to be accepted and valued in others, thereby supporting learners in pursuing further education abroad and workers in accessing international labour markets.

EU candidate countries have been actively engaging in this alignment process (The office for dual education and the national qualification framework, 2025).

(Western Blakan Alliance for work based learning , 2025).

(European Commission , 2023).

Beyond standards and frameworks, internationalising vocational excellence requires enabling transnational mobility. Policymakers should expand access to international exchange programmes – such as the EU Erasmus+ programme – for students, apprentices and teachers. These experiences build not only technical skills, but also intercultural competence, language proficiency and global awareness. Institutions must also invest in enhancing the ability of staff to manage international partnerships and deliver instruction in diverse and multilingual environments. The ETF's Network for Excellence (ENE) exemplifies networks that facilitate peer-learning activities for strengthening and greening VET. Additionally, the ETF's International Self-Assessment Tool for CoVEs (ISATCOVE) is a digital platform allowing VET centres to evaluate their activities against global best practices through a framework of 23 criteria across three dimensions, with several criteria focusing on environmental sustainability and green skills provision.

The UNEVOC network and the Bridging Innovation and Learning in TVET (BILT) project, supported by the German Federal Ministry of Education and Research (BMBF) and UNESCO-UNEVOC, is another example of international collaboration. BILT focuses on the **building and construction sector**, addressing key global challenges through the expertise of 31 leaders from Europe, Africa and Asia-Pacific (BILT Expert group website). Innovation and learning practices are being published continuously and can be accessed via an online database on the UNESCO-UNEVOC website. These activities support the implementation of the UNESCO Strategy for TVET 2022-2029 and the .

5.11 Data-driven approaches for demand-led CoVE activities

Recommendation

Establish clear outcome-based metrics as part of quality assurance systems to track CoVEs' performance effectiveness and cost-efficiency. Use these metrics to encourage innovations that respond to actual demand, whether for graduate employment, workforce training or entrepreneurship projects. Support this with reliable skills forecasting and regular stakeholder input to ensure that CoVEs' activities stay aligned with changing industry needs and technological advances.

Effective feedback mechanisms are essential for keeping vocational excellence in green construction responsive to industry needs, technological developments and policy priorities. These mechanisms should create continuous information exchange between CoVEs, industry partners, policymakers and stakeholders to support data-driven decision-making.

CoVEs should establish a robust feedback loop between education providers and research institutions to integrate industry innovations into VET curricula. This collaboration ensures that training remains aligned with evolving technological trends, including those driven by standardisation and regulations.

To strengthen these mechanisms, CoVEs should implement systematic graduate tracking to monitor the employment outcomes and career progression of alumni in green construction. This data provides valuable insights into training effectiveness and identifies emerging skill needs. Skills anticipation exercises, conducted with industry partners, research institutions and policy stakeholders, should translate insights into practical actions.

Skills anticipation in construction can serve as an innovation accelerator by helping companies identify emerging skill requirements related to new materials, digital tools, green technologies and construction methods. It also promotes learning-intensive work practices by encouraging shifts from traditional hierarchies to collaborative models that foster worker involvement in problem-solving and innovation.

Evidence (OECD, 2023) shows that skills anticipation efforts have a greater impact when using a clear, consistent methodological framework with agreed concepts among stakeholders. For maximum effectiveness, skills anticipation efforts should:

- build collaborative relationships based on trust;
- employ methods specifically tailored to green skills needs;
- focus on skills using a task-based approach rather than just occupational categories; and
- target specific sectors or regions.

In addition to formalised skills anticipation approaches, digital platforms can facilitate continuous feedback collection from employers, social partners, employees, students and teachers, creating real-time data flows that inform curriculum development and teaching practices. Annual stakeholder forums bringing together all players in the green construction skills ecosystem can provide opportunities for structured dialogue about system-wide challenges and opportunities emerging from skills anticipation studies and more informal localised approaches, ensuring that feedback leads to concrete actions and improvements.

As an example, the BuildSkills Academy project, funded under the Erasmus+ programme, has developed the BuildEnrichedSkills Methodology (BESM). This methodology guides VET providers in enhancing their courses through a structured process that includes self-assessment, gap identification, and enrichment. By establishing conceptual frameworks with clear classifications and definitions as the basis for data-driven approaches and robust feedback mechanisms at all levels, CoVEs can ensure that vocational excellence in green construction remains dynamic, relevant, and responsive to the evolving needs of the sector and society as a whole.

6. SUMMARY OF RECOMMENDATIONS AND CONCLUSIONS

Summary of policy recommendations and the implementation framework

The table below summarises the 11 policy recommendations detailed in this section, providing a clear and actionable overview of the key measures needed to advance vocational excellence and green skills development in the construction sector. These recommendations respond to the urgent need for systemic transformation driven by emerging environmental challenges and evolving labour market demands.

It organises each recommendation by specific actions, governance levels and responsible stakeholders, while linking them to relevant international frameworks of the EU Green Deal, the Sustainable Development Goals (SDGs) and the Paris Agreement. This alignment ensures that national and regional efforts contribute effectively to broader global commitments on sustainability, climate action and inclusive economic growth. Where applicable, the table also suggests timeframes for implementation to support strategic planning, progress tracking, and adaptive management.

By presenting the recommendations in this structured format, the table facilitates easier reference, enhances policy coherence, and supports stakeholders in coordinating efforts across multiple sectors and governance levels. This approach acknowledges the complexity of the green transition and vocational reform, emphasising the need for integrated, multi-stakeholder collaboration to build resilient, future-ready skills ecosystems. Ultimately, these coordinated actions aim to foster a just and inclusive transition, equipping workers and communities to thrive in a sustainable economy.

Table: Policy recommendations for vocational excellence and green skills development

#	Recommendation summary	Action items	Governance level	Responsible stakeholders	International framework alignment
1	Grant CoVEs greater autonomy for green construction training innovation	▪ Empower CoVEs with legal/managerial autonomy ▪ Establish clear accountability and multi-level governance	National, regional	Ministries of education and labour, CoVEs, private sector	**EU Green Deal**: European Skills Agenda, Pact for Skills **Paris Agreement** – Article 6: Capacity building **SDG 4.4**: Increase the number of youth and adults with relevant skills for employment, decent jobs and entrepreneurship
2	Build inclusive, place-based skills ecosystems	▪ Establish co-governance among government, industry and civil society ▪ Develop a shared long-term vision	Regional, local	Regional authorities, industry associations, civil society	**EU Green Deal**: Just Transition Mechanism, local climate resilience **Paris Agreement** – NDC implementation **SDG 8.5**: Achieve full and productive employment and decent work for all, with equal pay for equal value
3	Expand work-based learning partnerships	▪ Foster partnerships between CoVEs and construction companies ▪ Use apprenticeships and virtual simulations	Local, regional	CoVEs, employers, VET providers	**EU Green Deal**: Renovation Wave, Youth Employment Support **Paris Agreement** – Articles 6 & 11: Capacity building for low-carbon transition **SDG 4.4** (as above)
4	Enhance education and career guidance for green construction	▪ Coordinate outreach with schools and employment services ▪ Target underrepresented groups	National, regional	Education ministries, career services, industry	**EU Gender Equality Strategy 2020-2025** (aligned with Green Deal) **Paris Agreement** – Article 12: Education and awareness **SDG 5.5**: Ensure women's full participation and equal opportunities in leadership
5	Greening curricula with sustainability and digital skills	▪ Integrate BIM, energy-efficiency and circular economy principles ▪ Partner with industry for curriculum development	National	VET authorities, curriculum developers, industry	**EU Green Deal**: Circular Economy Action Plan, Digital Education Action Plan **Paris Agreement** – Article 12: Education and training **SDG 4.4** (as above)

6	Develop flexible upskilling/reskilling programmes for adults	▪ Create modular training and micro-credentials ▪ Include recognition of prior learning (RPL)	National, regional	CoVEs, adult education providers, social partners	**EU Pact for Skills, Green Deal Industrial Plan** (Net-Zero Industry Academy) **Paris Agreement** – Article 11: Capacity building **SDG 4.4** (as above)
7	Continuous professional development for VET teachers	▪ Provide CPD on green technologies and teaching methods ▪ Include industry placements and digital tools	National	Education Ministries, CoVEs, Teacher Associations	**EU Green Deal**: Lifelong Learning components **Paris Agreement** – Articles 11 & 12: Knowledge sharing and education **SDG 4.4** (as above)
8	Forge research and innovation partnerships	▪ Link CoVEs with universities and research institutes ▪ Develop living labs and innovation hubs	Regional, National	CoVEs, Universities, Research Institutes, Industry	**EU Green Deal**: Horizon Europe Missions (Climate, Cities) **Paris Agreement** – Article 10: Technology development and innovation **SDG 13.3**: Improve education and awareness of climate change mitigation and adaptation
9	Establish sustainable financing mechanisms	▪ Develop public-private funding models ▪ Use skills levies, tax incentives and climate finance instruments	National	Ministries of finance and education, private sector	**EU Green Deal**: Green Deal Investment Plan, Social Climate Fund **Paris Agreement** – Article 9: Climate finance commitments **SDG 4.4** (as above)
10	Internationalise vocational excellence	▪ Align with EQAVET and EQF ▪ Promote mobility via Erasmus+ and international partnerships	National, regional, local	Education authorities, CoVEs, international networks	**EU Green Deal**: Erasmus+ Green Mobility Scheme, European Education Area **Paris Agreement** – Articles 6, 11, 12: International cooperation, education **SDG 4.4** (as above)
11	Implement data-driven quality assurance and skills forecasting	▪ Adopt outcome metrics and stakeholder engagement ▪ Use digital platforms for real-time feedback	National, regional	CoVEs, industry, policymakers	**EU Green Deal**: GreenComp framework, skills intelligence tools **Paris Agreement** – Article 13: Enhanced transparency framework **SDG 4.4** (as above)

Conclusions

The greening of the construction sector represents both an urgent necessity and a significant opportunity for vocational education and training systems worldwide. As this thematic report has demonstrated, CoVEs are uniquely positioned to drive this transformation through their dynamic skills ecosystems and collaborative approaches.

The examples and insights presented throughout this paper illustrate how CoVEs can effectively bridge the green skills gap in construction by fostering partnerships across the entire value chain, developing innovative training methodologies and ensuring that education remains responsive to rapidly evolving industry needs. From integrating sustainability into curricula to providing work-based learning opportunities and leveraging research partnerships, these approaches collectively contribute to building a workforce equipped to implement sustainable practices across the sector.

The policy recommendations outlined provide a comprehensive framework for accelerating vocational excellence in green construction. By granting CoVEs greater autonomy within structured accountability frameworks, developing integrated skills ecosystems with shared governance, enhancing work-based learning opportunities and establishing sustainable funding mechanisms, policymakers can create the conditions for systemic change.

As we move forward, the success of these efforts will depend on continued collaboration among stakeholders, data-driven approaches to skills provision, and commitment to inclusive training pathways that leave no one behind in the green transition. International cooperation and knowledge exchange will be essential to scale effective practices and ensure that vocational excellence in green construction becomes a global reality rather than isolated pockets of innovation.

The transformation of the construction sector is not merely a technical challenge but a social and economic imperative. Through vocational excellence, CoVEs can help ensure that this transformation creates quality employment opportunities while contributing to a more sustainable built environment.

ACRONYMS

BCG	Boston Consulting Group
BESM	Build Enriched Skills Methodology
BIBB	Federal Institute for Vocational Education and Training
BIM	Building Information Modelling
BREEAM	Building Research Establishment Environmental Assessment Method
BUILD UP	European Portal for Energy Efficiency in Buildings
CEA	Center for Economic Analyses
CEDEFOP	European Centre for the Development of Vocational Training
CICan	Colleges and Institutes Canada
CLT	Cross-Laminated Timber
COP	Conference of the Parties (of the UN Framework Convention on Climate Change)
CoVE	Centre of vocational excellence
EBRD	European Bank for Reconstruction and Development
ENE	ETF Network for Excellence
ENE	ETF Network for Excellence
ENESAT	ENE Self-Assessment Tool
EQAVET	European Quality Assurance in Vocational Education and Training
EQF	European Qualifications Framework
ESCO	European Skills, Competences, Qualifications and Occupations
ETF	European Training Foundation
EU	European Union

EVBB	European Association of Institutes for Vocational Training
EVTA	European Vocational Training Association
FET	European Vocational Training Association
GIZ	German Agency for International Cooperation
GlobalABC	Global Alliance for Buildings and Construction
GRETA	Greening Responses to Excellence through Thematic Actions
HVACR	Heating, Ventilation, Air Conditioning and Refrigeration
ICA	Institute of Construction of Albania
ICBC	Intergovernmental Council for Buildings and Climate
IEA	International Energy Agency
IFMEREE	Training Institute for Renewable Energy and Energy Efficiency
ILO	International Labour Organization
INRAE	French National Research Institute for Agriculture, Food and Environment
ISO	International Organization for Standardization
LEED	Leadership in Energy and Environmental Design
NDC	Nationally Determined Contributions
NGO	Non-governmental organisation
OECD	Organisation for Economic Co-operation and Development
PEEB	Franco-German Programme for Energy Efficiency in Buildings
RPL	Recognition of Prior Learning
SGBC	Serbia Green Building Council
SME	Small and Medium-sized Enterprises

TP	True Positive
UNEP	United Nations Environment Programme
UNESCO-UNEVOC	International Centre for Technical and Vocational Education and Training
VET	Vocational Education and Training
VQA	Vocational Qualifications Authority
WEF	World Economic Forum

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