Towards a just transition for workers in the built environment in Europe

Building materials and on-site construction sectors

Research Report

31 January 2026, Brussels

ECORYS

Answering tomorrow's challenges today

Authors

Ivona Malbasic, Andrea Broughton, Ilektra Papadaki, Veronika Müller, Margherita Coltri, Clara Dassonville, Ina Martin, Karla Grosse Kohorst, Cécile Weber, Malin Carlberg, Jasminka Michalčáková and Aleksander Szpor (Ecorys).

Peer reviewers

European Federation of Building and Woodworkers (EFBWW), Building and Wood Workers International (BWI), Anabella Rosemberg.

The views expressed in this report are those of the authors alone and do not necessarily represent the positions or policies of any contributing organisation.

Table of Content

Authors 2

Executive summary 6

Introduction 14

1.1 Research objectives and scope 14

1.2 The European construction sector today: supply chain and workforce characteristics 17

1.3 The role of collective bargaining 25

2.0 Policy-driven construction decarbonisation and its impacts 26

2.1 Emission reduction targets and the legislative framework for decarbonising the built environment 27

2.1.1 The EU policy framework 27

2.1.2 Decarbonisation of construction in country-level policy frameworks 29

2.2 Impacts on supply chain, production and investments 30

2.3 Impacts on employment, workforce composition and skills 32

Worker groups most affected 37

3.0 Towards a just transition for construction workers 38

3.1 A just transition for the construction sector 38

3.1.1 Just transition at the EU-level 38

3.1.2 Just transitions at the country-level 40

3.2 Labour implications of decarbonisation 44

3.3 Workers' participation and protection mechanisms 49

3.4 Hotspots of transition 53

4.0 Conclusions 54

Annex I: Country Fiches 57

Annex II: List of organisations interviewed 57

Annex IV: Mapping of key partnerships and initiatives 59

Table of figures

Figure 1 Stakeholder groups to ensure a just transition of the construction sector 9
Figure 2 Geographical and sectoral scope 15
Figure 3 The construction sector scope in the context of this study 16
Figure 4 Employment projections in the construction sector 32
Figure 5 Employment shares of key occupations in construction (in %) 34
Figure 6 Hotspots of a Transition in the Construction Sector 54

List of tables

Table 1 Construction data at the EU and country level 18
Table 2 Number of enterprises in the steel, cement, timber and glass industries 20
Table 3 Number of employees in the on-site and construction raw materials sectors 22
Table 4 Employment trends at country level for women, youth and migrant workers in the broad construction sector 24
Table 5 Worker groups most affected 37
Table 6 Social- and gender-specific strategies or initiatives 42

List of boxes

Box 1 ILO definition of a just transition 16
Box 2 EU policy framework for the decarbonisation of the on-site construction industry 27
Box 3 EU policy framework for the decarbonisation of selected building material industries 28
Box 4 EU policy framework for the decarbonisation of selected building material industries 29
Box 5 EU just transition policies for building material and on-site construction sectors 39
Box 6 EU-initiatives supporting the just transition of building material and on-site construction sectors 39
Box 7 Key country-level just transition policies 41
Box 8 Effects on workers and labour rights 46

List of acronyms

AETA	Architectural and Engineering Activities; Technical Testing and Analysis
BWI	Building and Wood Workers' International
CAD/M	Computer-Aided Design/Manufacturing
CCS	Carbon Capture and Storage
CEDEFOP	European Centre for the Development of Vocational Training
CNC	Computer Numerical Control
CPR	Construction Products Regulation
CSDDD	Corporate Sustainability Due Diligence Directive
EBC	European Builders Confederation
EFBWW	European Federation of Building and Woodworkers
EPBD	Energy Performance of Buildings Directive
EQF	European Qualification Framework
ETS	Emission Trading System
EU	European Union
FIEC	European Construction Industry Federation
GDP	Gross Domestic Product
GPP	Green Public Procurement
ILO	International Labour Organisation
JTF	Just Transition Fund
JTM	Just Transition Mechanism
NACE	Statistical Classification of Economic Activities
NZEB	Nearly Zero-Energy Buildings
OSH	Occupational Safety and Health
SME	Small- and Medium-Sized Enterprise
UK	United Kingdom
VET	Vocational Education and Training

Executive summary

Introduction

This study examines the decarbonisation of the construction sector and its labour implications across ten European countries (Germany, France, the UK, Spain, Poland, Italy, the Netherlands, Czechia, Denmark, and Ireland). Its objective is to provide an overview of policies driving the decarbonisation of the built environment and associated industries (steel, cement, timber, and glass), and to assess the impacts on employment, working conditions, and worker protection (especially for vulnerable groups) through a just transition lens. The scope covers on-site construction activities and the main material supply industries, focusing on labour standards, workforce resilience, and mechanisms to ensure fairness and inclusion for workers affected by the transition. The report aims to inform industry, finance, civil society, policymakers, media, and philanthropy about the current trajectory of decarbonisation and the interventions needed to ensure decent work conditions, fairness and equity in the sector. This study was commissioned by Laudes Foundation.

Europe's built environment is decarbonising

The European construction sector is **vast and fragmented**, comprising nearly five million enterprises in 2023, dominated by micro and small-to-medium-sized firms. Employment in on-site construction reached 12.5 million workers in 2023, with an additional 1.89 million in material industries (steel, cement, timber, and glass). Despite steady growth since 2014, the sector faces structural challenges: extensive subcontracting chains, low collective bargaining coverage, and persistent labour rights issues.

The on-site construction economic footprint is significant: €856 billion value added and €2.7 trillion turnover in 2023. Overall, the workforce is ageing and remains male-dominated, with low female participation (14.4%), and migrant workers play a critical role. Older workers, women, and migrant workers are disproportionately exposed to precarious working conditions, including temporary contracts, lower pay, and higher occupational health and safety risks. Historically, construction activity focused on new builds, supported by supply chains. EU policies, driven by the European Green Deal, the Fit for 55 package, and the Renovation Wave Strategy, are now shifting priorities towards deep renovation, energy efficiency, and circularity. This transition is accelerating demand for retrofitting, prefabrication, and low-carbon materials, while reducing reliance on high-carbon materials such as steel and cement.

Optimistic forecasts suggest the renovation wave and green transition could **create jobs** in construction, with energy efficiency investments potentially increasing employment by 3-4% by 2030. Eurofound estimates 312,000 additional jobs by 2030, mainly in renovation-related roles. However, **overall growth in created jobs is modest** - about 1% - with high replacement needs due to retirements[1]. Around four million job openings are expected by 2035, driven by an ageing workforce, making recruitment and skills availability a key challenge. Labour demand varies regionally, with growth focused in areas like northern Italy and the Randstad in the Netherlands. This gap underscores the urgency of systematic training, better working conditions, and long-term policy consistency to attract and retain talent. Without these measures, Europe risks missing its climate targets and exacerbating social inequalities in the construction workforce.

Impacts of decarbonisation policies can be felt across the construction sector and its value chain. Short-lived renovation incentives cause market instability and price spikes ("short-termism") as seen with heat pump overproduction. Consistent, long-term policies are needed. Hybrid construction and prefabrication reduce demand for steel and cement, boosting timber and other low-carbon materials. The revised Construction Products Regulation pushes for sustainability, circularity, and digital product passports, encouraging cleaner production and shorter supply chains. Regions with strong industrial hubs and clean tech industries (e.g., Germany, Poland and France) are better placed for the transition, while carbon-intensive regions risk job losses. Prefabrication also shifts jobs and production locations, offering new opportunities but requiring regional and national support. Labour mobility remains limited by qualification and language barriers.

1. Eurofound (2023). Research report: Fit for 55 climate package: Impact on EU employment by 2030. Available at: https://www.eurofound.europa.eu/en/publications/all/fit-55-climate-package-impact-eu-employment-2030

The green and digital transition will reshape **occupational profiles**. Low-skilled on-site construction jobs and traditional masonry are declining, especially in France and the UK, which may strengthen the dominance of large firms. Skilled workers are moving to new developments, while less-skilled workers shift to small-scale renovations. Key skill areas include:

- Energy efficiency: insulation, heat pumps, ventilation, renewable integration.
- Digital skills: Building Information Modeling (BIM), CAD/CAM, geolocation, automation.
- Circular economy: material recovery, reuse, waste management.
- Transversal skills: regulatory compliance, project coordination, ability to work in teams.

Emerging roles include energy auditors, prefabrication technicians, and specialists in bio-based materials. CEDEFOP estimates that 35-45% of the renovation workforce will require targeted upskilling, while over nine million workers need basic climate and circular economy literacy.[2]

Decarbonisation can provide, but does not automatically lead to, better jobs or working conditions. **Job quality** could worsen without additional measures: fragmented subcontracting, short-term contracts, and low training uptake will persist. Automation and digitalisation may further displace low-skilled roles without adequate reskilling pathways. Low-skilled, manual roles (often held by migrant workers and workers in SMEs) are declining, while demand rises for highly skilled, digitally literate professionals. Many at-risk workers face job losses, precarious contracts, or exclusion if they lack access to upskilling. New "green" jobs may still involve hazardous conditions (e.g., asbestos in renovations), and there is conflicting evidence on whether they offer better quality than traditional roles. Without targeted support, decarbonisation risks deepening inequalities, and leaving vulnerable groups behind and exacerbate labour shortages. The construction sector should engage in re- and upskilling of its current workforce and improve attractiveness at the same time to attract and retain workers, particularly young and women.

Towards a just transition for workers in the built environment

A just transition in Europe's construction sector means ensuring that the shift to a decarbonised, green industry - driven by climate policies, digitalisation, and industrial restructuring - **delivers more and better jobs while addressing persistent structural challenges**. These include labour shortages, poor working conditions, and fragmented subcontracting chains. Central to this vision is that workers, especially vulnerable groups such as women, youth, and migrant workers, are not left behind as the sector transforms. A just transition is not only about job creation but also about improving job quality, safety, and inclusion, so that the benefits of the green transition are widely shared. It implies maximising the opportunities while reducing the risks of the decarbonisation process.

The **just transition is embedded in EU climate policy**, notably through the European Green Deal and its supporting instruments. Key initiatives include the Just Transition Mechanism, the European Fair Transition Observatory, the New European Bauhaus Academy for skills development, and the Social Climate Fund to support vulnerable households and small businesses.

At the national level, **approaches vary**: Spain leads with integrated policies and retraining programmes; France, Germany, and the UK link climate goals with labour measures and workforce training, while Poland and Italy have more limited construction-specific policies. There is a growing focus on inclusion, with targeted recruitment and training for underrepresented groups. Worker protection frameworks at the EU level provide a baseline of rights, complemented by national and sectoral measures. Currently, collective bargaining and works councils are essential for integrating just transition principles, ensuring access to training, and enabling worker participation in decision-making. Recent mechanisms - such as climate-related work stoppages, adaptive labour frameworks, and modern training systems - are emerging to strengthen workforce resilience. Social ID cards, subcontracting limits, and binding social procurement standards are being introduced to combat exploitation and promote fair conditions.

2. CEDEFOP (2023). The greening of the EU construction sector. Available at: https://www.cedefop.europa.eu/en/data-insights/greening-eu-construction-sector#_future_outlook

Despite progress, **significant gaps and challenges remain**. Skills shortages in green and digital areas, an ageing workforce, low female participation, and poor job quality persist. SMEs and self-employed workers face barriers to training, while fragmented subcontracting and undeclared work foster precarious employment. Occupational safety and health (OSH) compliance is often weak, exposing workers to hazardous substances, and the sector remains unattractive due to irregular employment and low wages. Vulnerable groups risk exclusion, creating a two-tier workforce between certified green roles and precarious traditional jobs. Many new mechanisms are still in advocacy or early implementation stages, and comprehensive protective frameworks are lacking in most countries. Labour rights deficits - such as low collective bargaining coverage, wage stagnation, precariousness, and limited access to training - undermine the sector's resilience and the fairness of the transition.

In recent years, several new mechanisms have been introduced which aim to strengthen the **resilience** of the workforce: climate-related provisions allow work stoppages and paid leave during extreme weather; adaptive labour frameworks like Spain's Sectoral RED Mechanism and the UK's proposed Employment Rights Bill balance flexibility with job security; and modern training systems across Europe equip workers with green and digital skills. Accountability tools such as subcontracting limits throughout the chain, social ID cards and binding social procurement standards combat exploitation and promote fair conditions. Targeted programmes for migrant workers and active trade union involvement further ensure inclusion and labour rights protection. Together, these mechanisms provide the foundation for a socially responsible just transition in construction. These best practices could be mainstreamed and scaled across Europe.

To ensure a just transition, Europe must scale up training infrastructure through modern vocational centres, regional hubs, and digital learning platforms to deliver green and digital skills. Training should be embedded in collective agreements, guaranteeing access during working hours without wage loss. Diversity and inclusion must be promoted through targeted recruitment of women, youth, and migrant workers. Worker protections need to be strengthened by enforcing safety standards, regulating subcontracting chains, and expanding social ID card schemes for transparency. Public procurement should reward companies that invest in workforce development and fair labour practices, aligning market incentives with social goals. Social dialogue and collective bargaining must be reinforced to ensure workers' voices are central in transition planning.

The green transition can reposition construction as a future-proof sector, offering safer, more technical roles such as energy auditors, prefabrication technicians, and digital fabrication specialists. By combining policy consistency, skills investment, social dialogue, and better enforcement of labour rights, Europe can transform the **construction sector into a driver of climate action and inclusive growth**, creating jobs that are not only more numerous but also better in quality.

Stakeholder intervention points to ensure a just transition

While workers will be most affected by the transition of the construction and building material sectors, there are several stakeholder groups that have agency and responsibility to ensure a just transition for workers. Below, we provide tailored recommendations for each of the following six groups:

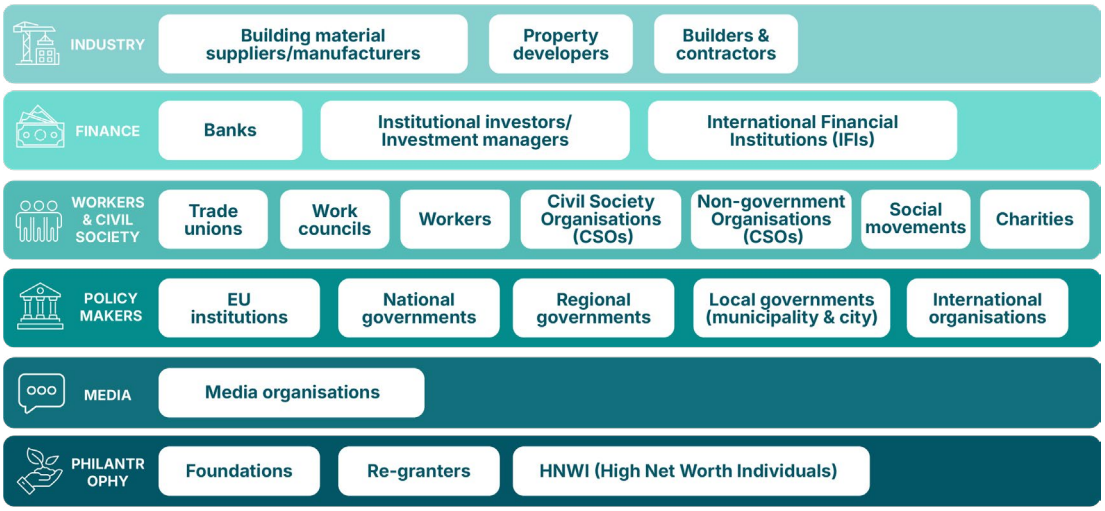


Figure 1 Stakeholder groups to ensure a just transition of the construction sector[3]

Industry

- **Support workforce upskilling:** Collaborate with vocational training providers and unions to ensure workers (especially in SMEs) access tailored, high-quality training for the skills required in a decarbonised building sector. To ensure workers' engagement in training, whether in adult education or initial VET, training systems must support both professional and personal development, equip workers with the ability to adapt to new technological developments, and enable opportunities for career mobility. For example, support regional training hubs and Centres of Vocational Excellence, as seen in Ireland and the Netherlands, which link vocational schools with employers and adapt curricula to evolving sector needs.

- **Strengthen OSH & labour standards:** Adopt best practices for OSH, especially in renovation and demolition (asbestos, hazardous materials). Ensure compliance with OSH when new technologies and automation are applied. Industries should also limit subcontracting tiers to ensure that labour rights are safeguarded along the value chain, following Spain's example of capping subcontracting at three levels and mandating registration to improve accountability and worker protection. Spain's Tarjeta Profesional de la Construcción and France's Carte Professionnelle BTP are cited as models for social ID cards. Other best practices include appointing a **OSH coordinator** in large construction sites, and **labour inspectors** in companies of more than 10 employees.

- **Promote diversity and inclusion:** Implement targeted recruitment and retention strategies for women and youth, while ensuring equal treatment of migrant and non-migrant members of the construction workforce in terms of protection and pay. Inclusive workplace campaigns and meaningful engagement with these under-represented or vulnerable groups will be crucial to overcoming labour shortages in the construction and building material sectors.

3. Based on actors visualised in Laudes Economic System Map The Built Environment System

- **Strengthen awareness and fully enforce due diligence processes:** The EU **Corporate Sustainability Due Diligence Directive** (CSDDD) requires large firms to identify & address adverse human rights and environmental impacts across value chains. Companies should move now to comply and to shape supplier behaviour. However, the most influential industrial actors sometimes lack a strong awareness and understanding of diligence processes. This issue can be tackled by investing dedicated human and financial resources to CSDDD awareness and expertise, implementing supplier ESG scorecards, adding contractual clauses requiring due diligence audits, and privileged working with suppliers that have published sustainability and/or just transition plans.

- **Develop sectoral/company just transition plans:** These plans should be elaborated with the involvement of all stakeholders and should identify clear timelines, climate targets and workforce impacts, organisation strategies to achieve these targets, and financial needs. Best practices from Germany's retraining agreements for lignite workers can be sources of inspiration. To implement these plans at the company-level, the Sustainable Business Network **highlights** the need to embed just transition plans into broader company strategies and to establish a sound governance system. At the European level, **progressive actors** took stock of the implementation of the Territorial Just Transition Plans and recommended to focus on the increased decentralisation of social, research and innovation capacities, paired with higher transparency and participation of various stakeholders.

Finance

- **Promote due diligence:** Require investees to implement due diligence processes in line with the EU CSDDD (even if not legally required), identifying and mitigating adverse social and labour impacts across their value chains. This includes supplier ESG scorecards, contractual clauses for due diligence audits, and a preference for suppliers with published sustainability and just transition plans, in alignment with national and European climate and social standards.

- **Align investments with just transition goals:** Prioritise investments in companies and projects that demonstrate robust decarbonisation strategies and fair labour practices. This means not only supporting energy-efficient renovations and low-carbon construction, but also requiring investees to show how they are upskilling workers, improving working conditions, and including underrepresented groups (women, youth) in their workforce. An interesting example is the **UK law** requiring all employers in the sector to pay the CITB levy, which funds training and support for the sector.

- **Incentivise green skills & job quality:** Offer preferential loan terms (such as **social bonds**), guarantees, or impact investment products to firms that invest in worker upskilling, provide stable contracts, and improve OSH standards, especially in renovation and retrofitting, where job quality risks are highest. Collaborate with public authorities, industry, and unions to fund or co-fund training centres, regional hubs, and apprenticeship programmes that address the acute skills shortages in energy efficiency, digitalisation, and circular construction. Ensure that training is accessible to SMEs and delivered during working hours, with recognition of formal and informal qualifications. For instance, tools like the EU Just Transition Fund and InvestEU are useful to support retraining and diversification in at-risk regions.

- **Support SMEs & innovation:** Provide accessible financing for SMEs to adopt new technologies, participate in training, and meet higher regulatory standards. SMEs dominate the construction sector but often lack the resources to invest in upskilling or compliance; targeted financial products can help bridge this gap. This can be done by backing innovation in off-site construction, prefabrication, and circular economy solutions that can improve both environmental and social outcomes, including safer and more stable jobs.

Workers & Civil Society

- **Advance worker-centred training:** Workers and their representatives should push for training that is free, delivered during working hours, and recognised across borders. This includes both vocational education and lifelong learning, with a focus on energy efficiency, digital skills, and circular economy principles. Civil society organisations and unions should participate in the co-creation of training content, ensuring it is tailored to the needs of different trades (e.g., bricklayers, electricians, insulation installers) and accessible to underrepresented groups such as women and youth. Workers and civil society can also push for systems that validate prior learning and experience, making it easier for workers to transition into new roles required by the green transition.

- **Strengthen collective bargaining & social dialogue:** Ensure that sectoral and company-level collective bargaining agreements include provisions for skills development, OSH, wage progression, and job security and quality in the context of decarbonisation. Unionscan also uphold and expand the right to organise and participate in unions, as this is fundamental for meaningful worker participation in transition planning and workplace protections. Finally, worker organisations should actively participate in policy discussions and transition planning at all levels, ensuring workers' voices are heard in decisions about decarbonisation and restructuring. For instance, Czechia's sectoral agreement obliges employers to ensure professional development and upskilling. Germany's "Work 4.0 Dialogue" platform brings unions and employers together to shape the future of work under digitalisation and decarbonisation. Spain's Sectoral RED Mechanism supports retraining and employment support for workers shifting into green roles.

- **Protect vulnerable groups:** Advocate for equal treatment, fair recruitment, language support, and recognition of prior skills. This also means pushing for inclusive recruitment and retention strategies, and monitoring the impact of transition policies on these groups. Useful tools include social ID cards, public procurement standards, and advocacy campaigns, stronger enforcement to combat informality, wage theft, and unsafe working conditions - especially inlong and complex subcontracting chains. For instance, Spain's "TándEM" project provides training and employment in building retrofits for vulnerable groups, including migrant workers and women.

- **Monitor and enforce labour rights:** Track the effects of European and national decarbonisation policies on job quality, inclusion, and regional disparities. Use data-driven tools and participate in monitoring initiatives (such as the forthcoming European Fair Transition Observatory) to ensure that no group or region is left behind.

Policy makers

- **Integrate just transition considerations in legislation:** The report highlights that decarbonisation policies must include explicit provisions for workforce impacts, not just technical standards. Furthermore, renovation and retrofitting policiesshould address both environmental and social objectives, including job quality, fair wages, and inclusion of underrepresented groups (women, youth). Worker protection, skills development, and social dialogue should be embedded in new expected national policies (e.g., the new National Building Renovation Plans to be finalised by December 2026). Furthermore, new EU policies (**Affordable Housing Plan**, European Strategy for Housing Construction, Construction Services Act) and the implementation (transposition, working plans, delegated acts) and revisions of existing climate and industrial policies (e.g., EPBD, CPR, CBAM) should be adequately monitored to measure their socio-economic impacts and address any adverse effects.

- **Fund inclusive training & reskilling:** Expand public investment in modern vocational education and training infrastructure, regional training hubs, and apprenticeship programmes. The report finds that most national renovation strategies lack dedicated funding for worker up-skilling and reskilling, risking labour and skills shortages. Training should be accessible, free, delivered during working hours, and recognised across borders. This is crucial for absorbing the projected four million job openings due to retirements and for meeting the demand for new jobs in energy efficiency, digital, and circular economy.

- **Enforce labour standards in procurement and public investments:** Reward companies that uphold fair wages, safe conditions, and training for green/digital skills. The report finds that non-binding frameworks discourage companies from investing in workforce upskilling and fair labour practices. France and Germany are cited as good practice examples, using charters and checklists to verify declared posted workers and compliance. More broadly, public investments in construction and renovation should link to robust social and environmental procurement standards. This sets minimum requirements for decent work across the supply chain and helps address skills shortages and job quality deficits.

- **Limit subcontracting & promote direct employment:** Spain's Law 32/2006 is highlighted as a model, capping subcontracting at three levels and mandating registration to ensure compliance with labour, social security, and OSH standards. Germany enforces subcontracting liability, making general contractors legally responsible for wage and safety compliance throughout the chain.

- **Monitor and address regional disparities:** Use data-driven tools (e.g., European Fair Transition Observatory) to identify hotspots, support regions at risk, and ensure equitable access to new jobs and training. The JTF and Territorial Just Transition Plans are cited as mechanisms to safeguard employment, promote reskilling, and economic diversification in regions dependent on carbon-intensive industries.

Media

- **Feature the human stories behind the transition:** Feature the experiences of construction workers adapting to new skills, such as insulation installers, heat pump technicians, and energy auditors, who are at the forefront of the renovation wave. Highlight the challenges faced by migrant workers, women, and young people entering a sector traditionally dominated by men, and show how targeted recruitment and training initiatives are opening new pathways.

- **Promote success stories & successes:** Share stories of innovative training centres and apprenticeship programmes, such as regional hubs in the Netherlands linking vocational schools with firms, or Spain's "TándEM" project, which provides training and employment in building retrofits for vulnerable groups, including migrant workers and women. Highlight companies and regions that have successfully implemented social ID card schemes, like France's Carte Professionnelle BTP or Spain's Tarjeta Profesional de la Construcción, which improve transparency and worker protection.

- **Expose risks and gaps:** Report on persistent issues such as wage theft, informality, and unsafe working conditions, especially in small-scale renovation projects and among subcontracted or migrant workers. For example, draw attention to the high rates of undeclared work in residential renovations and the OSH risks associated with asbestos exposure during retrofits. Examine the impact of short-term policy incentives on job stability, such as the volatility in demand for heat pump installers when subsidies are introduced or withdrawn.

- **Facilitate dialogue:** Organise roundtables or interviews with workers, union representatives, employers, and policymakers to discuss the realities of the transition, including the effectiveness of collective bargaining agreements in securing training and fair conditions. Provide platforms for underrepresented voices, such as women in construction, to share their perspectives on what is needed for a fairer sector.

Philanthropy

- **Fund worker-centred initiatives:** Invest in programmes that provide accessible, high-quality training for trades most needed in the renovation wave, such as insulation installers, heat pump technicians, and energy auditors. Fund projects that offer training during working hours, recognise prior learning, and actively recruit women, youth, and migrant workers. Prioritise inclusion of women, youth, and migrant workers in training initiatives. Support regional hubs and Centres of Vocational Excellence, as seen in Ireland and the Netherlands, which link vocational schools with employers and tailor curricula to evolving green and digital skills needs.

- **Catalyse innovation in skills & OSH:** Back pilot projects that develop new training content for emerging roles (such as digital construction, circular economy skills, and prefabrication). Fund initiatives that improve OSH, especially in renovation and demolition, where risks from asbestos and other hazardous materials are high. Support the scaling up of OSH training and the adoption of social ID card schemes for worker protection.

- **Support advocacy & further research:** Enable civil society and unions to monitor, evaluate, and advocate for fair labour standards, wage progression, and limits to subcontracting. For example, help trade unions and worker organisations participate in policy dialogue and collective bargaining, ensuring that just transition principles are embedded in sectoral agreements. Fund research and forums of exchange that bring together employers, workers, and policymakers to co-design transition plans and share best practices. Support mapping and analysis of sectoral trends, skills gaps, and regional disparities, enabling more effective targeting of resources and interventions. Fund the development of tools and observatories that track progress and highlight where additional support is needed.

Introduction

The construction sector in the European Union (EU) employs around 17.5 million people[4] - over 8.7% of the total workforce - and with its **five million enterprises**, it contributes about 5.3% of the EU's gross domestic product (GDP). Counting also the key industries supplying the construction sector (steel, cement, timber and glass), an additional **165,000 enterprises** and **1.9 million workers** are involved along the supply chain.[5] In total, 50% of all extracted materials used in the EU flows into the construction sector, resulting in 35% of waste generation in the EU[6]. At the same time, an estimated 39% of global emissions stem from the combination of embodied carbon emissions (covering emissions associated with the non-operational phase of a building: material extraction, construction product manufacturing, and the construction and renovation of buildings – 11%) and operational carbon emissions (covering emissions from the use stage of a building, depending on its energy efficiency – 28%)[7]. In the EU, embodied emissions account for 5–12% of total national GHG emissions[8], while operational carbon emissions make up 33% of all energy-related emissions[9]. For this reason, countries within the EU and beyond (i.e. the UK) have introduced binding legislation and comprehensive roadmaps to decarbonise construction and buildings.

1.1 Research objectives and scope

This report, commissioned by Laudes Foundation, **provides an overview of policies driving the decarbonisation of the built environment, the on-site construction and associated building material industries. It also assesses the labour implications for workers in these sectors**. The research approaches decarbonisation of the built environment through a **just transition[10]** lens. It evaluates impacts on employment, analyses labour implications and examines worker participation and protection mechanisms such as collective bargaining agreements, training programmes, and social safety nets for the most vulnerable workers. The study also explores ways to improve labour standards and workforce resilience in the transition.

Although national and European policy debates acknowledge concerns about the just transition in construction and building materials industries, these issues have not been examined as thoroughly as those in the energy sector. There is limited analysis of the **impacts of decarbonisation policies on construction workers** and of measures to strengthen their agency and inclusion.

This report aims to address the current knowledge gap by providing insights to industry, financial actors, workers and their representatives, civil society organisations, policymakers, media, and philanthropic institutions. It examines the trajectory of decarbonisation in the built environment and outlines the necessary steps to ensure decent working conditions in the construction and building material sectors.

4. European Commission, 2026. The construction sector. Available at: https://single-market-economy.ec.europa.eu/sectors/construction_en

5. Eurostat data 2022/2023 – see detailed sources in section 1.2.

6. European Commission (2020). A new Circular Economy Action Plan For a cleaner and more competitive Europe. COM/2020/98 final. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1583933814386&uri=COM:2020:98:FIN

7. World Global Building Council (2019). Bringing embodied carbon upfront. Available at: https://worldgbc.s3.eu-west-2.amazonaws.com/wp-content/uploads/2022/09/22123951/WorldGBC_Bringing_Embodied_Carbon_Upfront.pdf

8. European Commission (2020). A new Circular Economy Action Plan For a cleaner and more competitive Europe. COM/2020/98 final. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1583933814386&uri=COM:2020:98:FIN

9. EEA (2025). Greenhouse gas emissions from energy use in buildings in Europe. Available at: https://www.eea.europa.eu/en/analysis/indicators/greenhouse-gas-emissions-from-energy

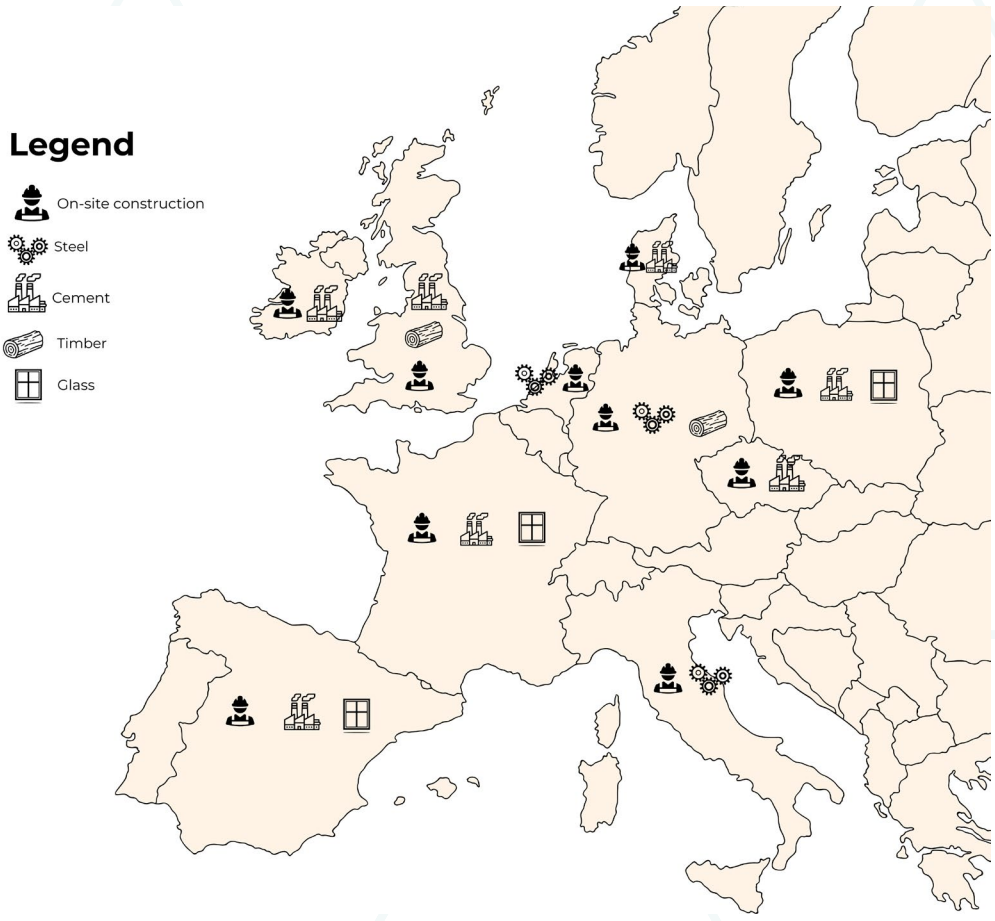
10. Laudes Foundation (2024). Mapping and Trend Analysis on Just Transition Initiatives. Available at: https://www.laudesfoundation.org/latest/news-and-stories/stories/2024/mapping-and-trend-analysis-on-just-transition-initiatives/

The study focuses on ten European countries: Germany, France, the United Kingdom, Spain, Poland, Italy, the Netherlands, Czechia, Denmark, and Ireland (countries in focus for Laudes Foundation's Built Environment programme, exemplifying different models of collective bargaining)[11]. EU-level data is integrated to strengthen the analysis and ensure alignment with European policy frameworks. Country-level findings are summarised in this report, with full details provided in Annex I.

The study covers the **core/on-site construction sector and the four key industries supplying most building materials and products**. Through the report, we refer to the core/on-site construction sector as on-site construction, covering site preparation, installations, finishings, as well as renovations, refurbishing, repurposing, demolition and recycling. To provide an initial overview, we also include workers involved in architectural and engineering activities; technical testing and analysis, maintenance, facility management and repairs for buildings (NACE 71). To ensure a comprehensive assessment of the implications of decarbonisation across the whole supply/value chain, the study also examines changes in the four industries that supply most building materials and products: steel, cement, timber and glass (see Figure 2).

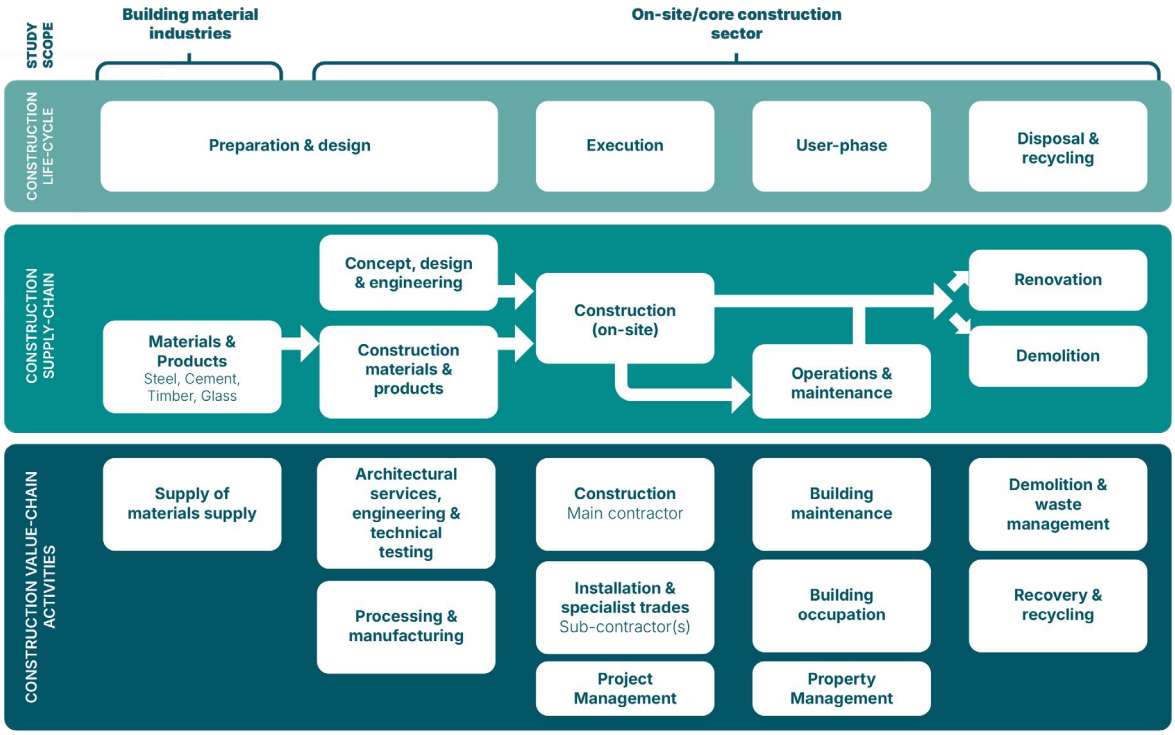
While other construction materials, such as ceramics, bricks, and plastics, play an important role, this study focuses on the four industries previously mentioned. These sectors account for the largest shares of embodied carbon in buildings, are among the most energy-intensive (with the exception of timber), and represent the highest material flows into the construction sector. Real estate services, although part of the broader construction value chain, are excluded from this analysis due to their distinct nature of work and comparatively lower emissions. Consequently, their decarbonisation impact is expected to be minimal compared to the core construction sector and the four material industries.

Figure 2 Geographical and sectoral scope



11. Findings from these countries are presented in aggregated format in this report. Detailed Country Fact Sheets are included in Annex I. While the core countries of Laudes Foundation's Built Environment programme, Germany, France, the United Kingdom, Spain, and Poland, have been analysed in depth, including two building material industries, Italy, the Netherlands, Czechia, Denmark and Ireland were analysed more lightly, covering only one building material industry each.

Figure 3 The construction sector scope in the context of this study



Finally, the '**just transition**' scope is based on the ILO's 2016 Guidelines for a just transition towards environmentally sustainable economies and societies for all (see box below). Although existing guidelines identify construction as a key sector where more productive processes could improve job quality and incomes, a comprehensive concept for the built environment is still lacking. The term 'just transition' is interpreted differently worldwide and by various stakeholders, depending on economic, social, and ecological contexts. In Europe -the focus of this study- the concept is closely associated with social fairness and, consequently, with labour and working conditions. This report examines the impacts of greenhouse gas reduction policies on labour conditions for the most directly affected group in the construction sector: employed workers.

Box 1 ILO definition of a just transition[12]

The greening of economies in the context of sustainable development and poverty eradication will require a country-specific mix of macroeconomic, industrial, sectoral and labour policies that create an enabling environment for sustainable enterprises to prosper and create decent work opportunities by mobilizing and directing public and private investment towards environmentally sustainable activities. The aim should be to ***generate decent jobs all along the supply chain, in dynamic, high value added sectors which stimulate the upgrading of jobs and skills as well as job creation and improved productivity*** *in more labour-intensive industries that offer employment opportunities on a wide scale.*

This study does not provide a comprehensive overview of all issues related to the decarbonisation of the broader built environment or the full range of solutions for a just transition. Its scope is limited to ten selected countries and focuses narrowly on the construction and building material sectors. The core construction sector is assessed in detail in all ten countries, while the depth of analysis varies in the building material industries, with the one or two biggest industries (measured by volume of material output produced in tons) analysed per country. For Italy, the Netherlands, Czechia, Denmark and Ireland, the analysis focuses on either steel or cement, depending on which material has the highest output. Germany, France, the United Kingdom, Poland, and Spain are subject to a deeper analysis, including steel or cement and an additional industry (either timber or glass) selected based on its importance in material output.

12. ILO (2016). Guidelines for a just transition towards environmentally sustainable economies and societies for all. Available at: https://www.ilo.org/publications/guidelines-just-transition-towards-environmentally-sustainable-economies

The sectors analysed are undergoing significant **transformation driven by digitalisation, automation, robotisation, cost pressures, and a shift towards off-site construction**. At the same time, they face multiple crises that affect both industry and society, including the climate crisis-with implications for adaptation, biodiversity, and land use-the energy crisis, raw material shortages, and disruptions linked to geopolitical tensions and conflicts in and around Europe, which have created urgent reconstruction needs. In addition, the European population is expected to age and shrink, all while immigration policies become more restrictive. Although this report focuses on labour rights challenges emerging from decarbonisation-related transitions, we acknowledge that labour rights in construction are currently challenged by a variety of factors.

1.2 The European construction sector today: supply chain and workforce characteristics

On-site construction

As per the latest available data (2023), there are close to **four million active construction enterprises (NACE F).**[13] If one includes also the number of enterprises in **architectural and engineering activities, and technical testing and analysis (NACE M71, short AETA), this reaches a total of five million enterprises** in 2023. From 3,91 million enterprises in 2011, the number fluctuated slightly in the early years but then rose steadily since 2017, reflecting growth in the sector. Notably, there was a dip in 2013 to about 3.92 million, but from 2014 onward, the sector recovered and expanded consistently. The sharpest growth appears between 2019 and 2023, where enterprises increased from approximately 4.39 million to nearly five million. This suggests sustained investment and business formation in construction across the EU, with a **nearly 29% increase in enterprises over the 12 years and steadily growing value added and net turnover** (see below).[14]

In countries where the number of enterprises is the highest, the average employment size (number of persons per construction enterprise) is low, pointing to many micro, small- and medium-sized enterprises (SMEs) making up the construction sector. The range within Europe goes from enterprises with only two employees on average in the Netherlands to Germany, where the average employment size is 7.3.

The **construction sector is dominated by a high share of local micro-enterprises and SMEs and long chains of subcontracting**. Building materials and equipment are generally purchased or hired from different enterprises. Specialised services are supplied by subcontractors. Design and engineering services are also provided by separate professional entities[15]. Extensive subcontracting is identified as a structural challenge for the sector, which, according to the European Labour Authority, amplifies other challenges related to imposing labour laws and conducting controls on construction sites, jeopardising occupational health and safety, causing late payments and even payment avoidance and certainly limiting the opportunities for training[16][17].

At the EU-level, the average employment size showed a gradual downward trend between 2011 and 2023, indicating a shift towards smaller business structures and more sole trading. The figure declined from 3.65 in 2011 to a low of 3.37 in 2014, then remained relatively stable with slight fluctuations and increased to 3.57 employees in 2023.

13. Including NACE F41 Construction of buildings; F42 Civil engineering; F43 Specialised construction activities. NACE is a Statistical Classification of Economic Activities in the European Community.

14. Eurostat (2026). Enterprises by detailed NACE Rev. 2 activity and special aggregates. Available at: https://ec.europa.eu/eurostat/databrowser/view/sbs_ovw_act/default/table?lang=en

15. ILO (2025). Sector portal on construction. Available at: https://www.ilo.org/topics-and-sectors/industries-and-sectors/construction

16. ELA (2021). Successful cooperation approaches between labour inspectorates and social partners. Available at: https://www.ela.europa.eu/sites/default/files/2021-12/Learning-resource-paper_TRW_Social_Partners.2021_EN.pdf

17. EFBWW, ETUC. Who's the Boss - Stop exploitation in subcontracting chains. Available at: https://limitsubcontracting.eu/

Table 1 Construction data at the EU and country level

	Number of enterprises		Value added in million € per year and in % of total GDP		Net turnover in million € per year)		Av.employment size
	Construction (NACE F)	AETA (NACE M71)	Construction (NACE F)	AETA (NACE M71)	Construction (NACE F)	AETA (NACE M71)	
EU27 [18]	3,956,573	1,101,599	673,461 (4.2%)	182,718 (1.1%)	2,308,110	415,110	3.6
Germany	382,861	121,653	169,679 (4.3%)	53,773 (1.3%)	425,691	120,809	7.3
France	572,932	105,037	117,458 (4.4%)	31,206 (1.2%)	400,600	67,586	3.7
Spain	418,214	109,597	52,426 (3.8%)	13,940 (1.0%)	188,644	35,640	3.2
Poland	421,187	81,407	26,369 (4.0%)	4,158 (0.6%)	128,149	12,008	2.7
Italy	521,371	246,422	83,722 (4.2%)	18,802 (0.9%)	317,405	32,081	3.1
Netherlands	273,647	54,847	42,700 (4.3%)	12,489 (1.3%)	154,451	27,207	2.0
Czechia	199,428	47,498	10,333 (3.6%)	2,705 (0.9%)	51,868	8,469	2.1
Denmark	36,409	7,895	13,737 (3.6%)	5,129 (1.3%)	49,761	11,405	5.5
Ireland	65,387	10,246	12,296 (2.4%)	4,136 (0.8%)	46,471	12,823	2.9
UK [19]	364,514	n/a	138,000	n/a	139,029	n/a	<3
Source: Eurostat [20]	2023	2023	2022	2022	2023	2023	2023

The **value added by the core construction sector (NACE F) accounted for €674 billion in 2022**, with an additional €183 billion in AETA (NACE M71). The total €856 billion was reached after a steady decline from 2011 (€539 billion) to 2013 (€520 billion) and then a rapid increase to €709 billion in 2019. From there, the sector saw a sharp drop to €547 billion in added value in 2020, likely due to the economic impacts of the COVID-19 lockdowns. However, the sector rebounded strongly after that, with value added surging to €794.1 billion again in 2021 and further to €856.2 billion in 2022.

The **net turnover of construction businesses** saw similar trends. After a gradual growth from €1.6 trillion in 2011 to €2 trillion in 2019, the sector experienced a sharp drop to €1.7 trillion in 2020. After that, the construction sector rebounded strongly, with **turnover surging to €2.7 trillion in 2023**: with €2.3 trillion coming from the core construction sector (NACE F) and an additional €415 billion coming from AETA (NACE M71).[21] The value added and net turnover values of the construction sector are proportionate to the size of the ten country-level economies, with Germany, the UK and France driving the European construction economy. The value added in construction in proportion to total value added (GDP) in 2022 is highest in France (4.4%), the Netherlands and Germany (4.3% of GDP) and lowest in Ireland (2.4% of GDP). Within AETA, the trend is similar with the highest shares of GDP recorded in the Netherlands, Germany, Denmark (1.3%) and France (1.2% of GDP).

18. Excluding the United Kingdom.

19. Office for National Statistics (2023). Construction statistics. Available at: https://www.ons.gov.uk/businessindustryandtrade/constructionindustry/articles/constructionstatistics/2023 and UK Government (2026). BEIS Construction sector team. Available at: https://www.gov.uk/government/groups/bis-construction-sector-team

20. Eurostat (2026). Enterprises by detailed NACE Rev. 2 activity and special aggregates. Available at: https://ec.europa.eu/eurostat/databrowser/view/sbs_ovw_act/default/table?lang=en

21. Ibid.

The construction sector supply chain

As shown below, industries such as **steel, cement, timber and glass** are important for the built environment, as construction absorbs considerable shares of the materials and products of these industries [22]. The selected industries provide materials and products to other sectors, not only construction. However, given their importance for buildings and infrastructure and the interconnections of transformations as a result of decarbonisation, they are jointly analysed in this study.

Steel 	In 2024, the EU27 is the third-largest producer of **steel** globally, after China (54.6%) and India (8.1%), accounting for 7% of global output with a production of 129.6 million tonnes in 2024.[23] Construction is the largest steel-consuming industry in the EU, representing 35% of total steel consumption in 2024,[24] where it is widely used for frameworks, reinforcements and large-scale infrastructures.
Cement 	The EU27 accounted for 4% of global **cement** production, producing 161.1 million tonnes in 2023, after China (50.2%) and India (10.4%).[25] Production in Europe is projected to plateau after 2030 due to a shift from new construction to renovation activities.[26] In the EU, cement consumption mainly goes to the construction of new buildings (42%) and new civil engineering structures (25%), with smaller shares used for building renovation (4%) and the renovation of civil engineering works (1%).[27] Cement remains essential for foundations, walls, and the overall structural integrity of buildings and infrastructure.
Timber 	In 2022, the EU27 produced a total of 509 million m^3 of **roundwood** (i.e. all quantities of wood removed from a forest), collectively exceeding the production of any single country, including the United States, Brazil, and Russia.[28] About 24% of roundwood production was used as fuelwood, while the remainder was industrial roundwood used for sawn wood, veneers, pulp and paper[29], which includes but is not limited to construction applications. In construction, wood is a common material for prefabricated elements, flooring, window elements, facades and building structures.
Glass 	The EU27 produces approximately 10 million tonnes of **flat glass** annually, the type commonly used in construction.[30] Construction is the largest consumer, accounting for roughly 80% of production, mainly for windows and architectural features. The remaining 5% is used for solar installations, appliances, furniture, and electronics, some of which also intersect with construction and buildings.[31]

Table 2 presents the **number of enterprises operating in the steel, cement, timber and glass industries**. These figures include companies that supply construction materials, but are not limited exclusively to the construction sector, as they may also operate in other industries.

22. Other building materials like bricks, ceramics and plastic are important too but fall outside the scope of this study (see section 1.1).

23. Eurofer (2025). European Steel in Figures 2025. Available at: https://www.eurofer.eu/assets/publications/brochures-booklets-and-factsheets/european-steel-in-figures-2025/European-Steel-in-Figures-2025_23062025.pdf

24. Eurometal (2025). Eurofer downgrades steel consumption outlook for Europe. Available at: https://eurometal.net/eurofer-downgrades-steel-consumption-outlook-for-europe

25. CEMBUREAU (2024). Activity Report 2024. Available at: https://www.cembureau.eu/media/sblceede/cembureau-activity-report-2024.pdf

26. Deetman S. et al. (2020). Modelling global material stocks and flows for residential and service sector buildings towards 2050. Available at : https://www.sciencedirect.com/science/article/abs/pii/S0959652619335280?via%3Dihub

27, Walker, A. et al. (2025). Environmental and Socio-Economic Impacts of the Circular Economy Transition in the EU Cement and Concrete Sector. Available at: https://publications.jrc.ec.europa.eu/repository/handle/JRC143126

28. Eurostat (2023). Wood products – production and trade Available at: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Wood_products_-_production_and_trade

29. Ibid.

30. Glass for Europe (2026). Key figures of the flat glass industry. Available at: https://glassforeurope.com/key-data/

31. Ibid.

Table 2 Number of enterprises in the steel, cement, timber and glass industries

	Steel[32]	Cement[33]	Timber[34]	Glass[35]
EU27[36]	12,192	20,000	126,484	6,951
Germany	1,938	1,718	9,811	571
France	840	1,144	6,280	319
Spain	1,315	1,800	7,267	765
Poland	1,241	3,402	16,014	736
Italy	2,628	2,626	17,441	2,154
Netherlands	420	552	2,840	493
Czechia	1,264	948	22,938	250
Denmark	147	132	398	34
Ireland	357	n/a	1,375	n/a
UK[37]	1,145[38]	6 [39]	5,167[40]	21,203[41]
Source: Eurostat, 2023[42]				

The following table provides an overview of the key characteristics, transition challenges, and decarbonisation trends in the supply chains of the four major construction materials across selected countries for this analysis (see Annex I). The summaries highlight the main industry players, regional distribution and characteristics in each context.

32. NACE codes: C24.1 Manufacture of basic iron and steel and of ferro-alloys; C24.2 Manufacture of tubes, pipes, hollow profiles and related fittings, of steel; C24.3 Manufacture of other products of first processing of steel; C24.4.2 Aluminium production; C24.4.3 Lead, zinc and tin production; C24.4.4 Copper production; C24.4.5 Other non-ferrous metal production; C24.5 Casting of metals.

33. NACE codes used (C23.5 Manufacture of cement, lime and plaster; C23.6 Manufacture of articles of concrete, cement and plaster) cover the entire sector; figures presented here may not exclusively reflect cement-related activities and should be interpreted accordingly.

34. NACE codes: C16.1 Sawmilling and planing of wood; C16.2.1 Manufacture of veneer sheets and wood-based panels; C16.2.2 Man-ufacture of assembled parquet floors; C16.2.3 Manufacture of other builders' carpentry and joinery; C16.2.4 Manufacture of wooden containers.

35. NACE codes: C23.1.1 Manufacture of flat glass; C23.1.2 Shaping and processing of flat glass; C23.1.4 Manufacture of glass fibres.

36. Excluding the United Kingdom.

37. Office for National Statistics (2023). Construction statistics. Available at: https://www.ons.gov.uk/businessindustryandtrade/constructionindustry/articles/constructionstatistics/2023 and UK Government (2026). BEIS Construction sector team. Available at: https://www.gov.uk/government/groups/bis-construction-sector-team

38. House of Commons Library (2024). UK steel industry: statistics and policy. Available at: https://commonslibrary.parliament.uk/research-briefings/cbp-7317/

39. There are six major cement producers in the UK, represented by the Mineral Products Association.

40. Figures relate to 2024. Sourced from *Forestry & Logging in the UK - Market Research Report (2014-2029)*. Available at: https://www.ibisworld.com/united-kingdom/industry/forestry-logging/230/.

41. Ibis World (2024). Glass & glass product manufacturing in the UK - Number of businesses (2011-2031). Available at: https://www.ibisworld.com/united-kingdom/number-of-businesses/glass-glass-product-manufacturing/200163/

42. Eurostat (2026). Enterprises by detailed NACE Rev. 2 activity and special aggregates. Available at: https://ec.europa.eu/eurostat/databrowser/view/sbs_ovw_act/default/table?lang=ens

Steel

The European steel industry is highly concentrated and strongly tied to the construction sector. Each national market is dominated by a small number of major producers. Germany is the EU's largest steel producer (notably Thyssen Krupp, Salzgitter, and ArcelorMittal), followed by Italy (Acciaierie d'Italia, Marcegaglia, and Arvedi) and the Netherlands (Tata Steel). Construction accounts for a significant share of steel output, ranging from around 23% in the Netherlands to over 36% in Italy.

Across these countries, the sector is undergoing a major transformation towards green steel, driven by investments in hydrogen-based steelmaking, electric arc furnaces, and related low-emission technologies.

Cement

The European cement industry is highly concentrated, with a few major producers dominating national markets. Spain, France, Poland, the UK, Denmark, Ireland, and Czechia all have leading companies that supply both domestic and export markets. Key examples include Cemento Molins, Holcim, and Cementos Portland Valderrivas in Spain; Górażdże Cement and Holcim Polska in Poland; Breedon Group, Cemex UK, and Tarmac in the UK; Aalborg Portland in Denmark; and Českomoravský Cement in Czechia. In most countries, a large share of cement output is consumed by the construction sector, typically exceeding 40-50%.

Across these countries, the sector is undergoing a significant decarbonisation shift driven by national and EU climate policies. Common strategies include investments in carbon capture and storage (CCS), alternative fuels, clinker substitution, digitalisation, and circular economy practices.

Timber

The European timber industry is concentrated around a few major producers and is closely linked to the construction sector. Germany and the UK are key players, with companies such as EGGER and Binderholz in Germany producing engineered wood products (cross-laminated timber, glulam, panels) and the UK focusing on softwood and hardwood processing. A significant share of output (around 60–70% of sawn wood in Germany) is used in construction, reflecting the sector's increasing role as a low-carbon alternative to steel and cement.

Across both countries, the sector has benefited from national and EU policies promoting sustainable timber use and decarbonisation. Germany is also experiencing a big wave of transformation in building materials and is increasingly working with wood through a hybrid approach. The turn of the sector towards prefabrication, enabled by digitalisation, also benefits the timber industry.

Glass

The European flat glass industry is concentrated around a few key producers and is closely linked to construction, with around 80% of output used in building across Spain, France, and Poland. Leading companies include TVITEC and AGC Flat Glass Ibérica in Spain, Saint-Gobain Glass and AGC Glass in France, and Press Glass and NordGlass in Poland.

Production of glass is expected to shift toward low-carbon processes and to grow in the coming decades, particularly in the area of energy-efficient windows and solar PV panels. A constant threat to the EU market and subsequently the employment in glass production (for solar PVs) is the domination of Chinese products. The EU has set a 2030 goal to meet at least 40% of the EU's annual solar PV deployment needs by local production[43], providing predictability, certainty and long-term signals to glass manufacturers and investors.

43. European Commission (2023). *Net Zero Industry Act*. COM(2023) 161 final. Available at: https://eur-lex.europa.eu/resource.html?uri=cellar:6448c360-c4dd-11ed-a05c-01aa75ed71a1.0001.02/DOC_1&format=PDF

Construction companies and companies producing building materials are **completely different in their composition**. On the one side, construction companies are predominantly micro- and SMEs. On the other side, steel, cement, timber, and glass companies are large, often employing thousands of people. As a result, the labour conditions and challenges observed in the transition are very different (see section 3.2).

Workforce characteristics

In 2023, a total of **12.5 million people were employed in the EU's on-site construction sector**: 4.2 million in the development of building projects and construction of residential and non-residential buildings (NACE F41) and 8.3 million in specialised construction activities, including demolition and site preparation and electrical, plumbing and other construction installation activities (NACE F43). Despite a decrease of 160,000 workers between 2019 and 2021, this number has been steadily growing since 2011 (in which 11.4 million workers were active in on-site construction). Across the EU, **employment in construction as a proportion relative to total employment** remains stable with a slight positive trend from 6.12% in 2013, dipping briefly to 6% in 2014 and 2018 and reaching **6.09%** again in 2023.[44]

If one looks at the **broader construction sector,** including civil engineering (NACE F42)[45] and AETA (NACE M71), a **total of 17.4 million people** were employed in the EU in 2023, equivalent to **8.7% of total employment**. Across the ten focus countries, the number of employees is, logically, biggest in Europe's largest economies (Germany, the UK and France). However, the share of construction employment relative to total employment is greatest in Czechia (10.27%), followed by France (9.22%), Ireland (9.04%), Denmark (8.88%), Germany (8.71%), and Italy (8.68%). In Spain, the UK, Poland, and the Netherlands, construction accounts for less than 8% of total employment.

When extending the analysis to the **industries** that supply construction materials (namely steel, cement, timber and glass manufacturing), **an additional 1.89 million workers are employed** across the EU27. **Steel** manufacturing represents the **largest share**, with 853,000 employees, followed by timber (almost 806,000), glass (171,000) and cement (almost 70,000). Germany alone employs over 510,000 workers across these four industries, while Italy and Poland also record substantial employment, particularly in timber and steel. Table 3 presents the number of employees in on-site construction together with these key raw-material sectors. As noted in the previous section, a large share of workers in the raw-material industries can be attributed to the construction value chain. However, some may be absorbed in other contexts.

Table 3 Number of employees in the on-site construction sector and selected industries

	Construction (NACE F)	AETA (NACE M71)	Steel[46]	Cement[47]	Timber[48]	Glass[49]
EU27[50]	14,125,432	3,239,418	852,996	69,748	805,739	171,145
Germany	2,780,641	774,471	250,768	89,315	133,249	39,147
France	2,129,384	454,120	70,093	47,404	59,211	11,830
Spain	1,350,153	314,210	60,947	32,615	47,420	11,948
Poland	1,147,276	167,615	69,030	55,637	115,051	26,317
Italy	1,623,703	358,932	114,483	38,387	81,900	18,293
Netherlands	556,843	159,714	9,084	10,467	16,459	2,283

44. Eurostat: Employment by detailed NACE Rev. 2 activity and special aggregates.

45. Including the construction of roads and railways, utility projects, and other civil engineering projects.

46. NACE codes: C24.1 Manufacture of basic iron and steel and of ferro-alloys; C24.2 Manufacture of tubes, pipes, hollow profiles and related fittings, of steel; C24.3 Manufacture of other products of first processing of steel; C24.4.2 Aluminium production; C24.4.3 Lead, zinc and tin production; C24.4.4 Copper production; C24.4.5 Other non-ferrous metal production; C24.5 Casting of metals.

47. NACE codes used (C23.5 Manufacture of cement, lime and plaster; C23.6 Manufacture of articles of concrete, cement and plaster) cover the entire sector; figures presented here may not exclusively reflect cement-related activities and should be interpreted accordingly.

48. NACE codes: C16.1 Sawmilling and planing of wood; C16.2.1 Manufacture of veneer sheets and wood-based panels; C16.2.2 Man-ufacture of assembled parquet floors; C16.2.3 Manufacture of other builders' carpentry and joinery; C16.2.4 Manufacture of wooden containers.

49. NACE codes: C23.1.1 Manufacture of flat glass; C23.1.2 Shaping and processing of flat glass; C23.1.4 Manufacture of glass fibres.

50. Excluding the United Kingdom

	Construction (NACE F)	AETA (NACE M71)	Steel[51]	Cement[52]	Timber[53]	Glass[54]
Czechia	413,056	89,285	39,540	16,525	43,942	4,461
Denmark	199,726	56,147	5,441	8,348	7,483	573
Ireland	187,008	45,341	1,279	n/a	5,271	148
UK	2,650,000[55]	n/a	33,700[56]	2667[57]	21,000[58]	502,837[59]

Source: Eurostat, 2023[60]

At the EU-level, **demographic trends** reveal a slight increase in **female participation in the construction sector**, rising from 1.91 million in 2013 to 2.46 million in 2023 (from 12.6% to 14.4% of the workforce). **Male employment** also grew, but at a slower rate, with their share dropping to 85.6% of the workforce. The workforce is ageing, with notable growth in the 50-64 and 65+ age brackets. Youth employment (15-24) remains stable around 7-7.5%, supported by vocational initiatives. **Migrant workers** play a crucial role in the European core construction industry. In 2022, 9% of working non-EU citizens in Europe were working in construction, compared to only 6.6% of EU working citizens. At the EU-level, migrant workers, representation is increasing, with first-generation migrant workers rising from 14% to 16% of the workforce between 2021 and 2023, while native-born workers show a slight decline.[61] And these figures only represent documented migrant workers, while undocumented migrant workers are also known to quickly enter the construction sector when arriving in a new city or country, if they cannot find work in other fields that they have been trained in[62]. With some EU countries purchasing up to 44% of undeclared services (i.e. in repairs and renovations)[63], the construction sector is an attractive sector for undocumented migrant workers to generate income.

At the country level, trends in terms of female, migrant workers and youth participation in the construction workforce vary.

51. NACE codes: C24.1 Manufacture of basic iron and steel and of ferro-alloys; C24.2 Manufacture of tubes, pipes, hollow profiles and related fittings, of steel; C24.3 Manufacture of other products of first processing of steel; C24.4.2 Aluminium production; C24.4.3 Lead, zinc and tin production; C24.4.4 Copper production; C24.4.5 Other non-ferrous metal production; C24.5 Casting of metals.

52. NACE codes used (C23.5 Manufacture of cement, lime and plaster; C23.6 Manufacture of articles of concrete, cement and plaster) cover the entire sector; figures presented here may not exclusively reflect cement-related activities and should be interpreted accordingly.

53. NACE codes: C16.1 Sawmilling and planing of wood; C16.2.1 Manufacture of veneer sheets and wood-based panels; C16.2.2 Man-ufacture of assembled parquet floors; C16.2.3 Manufacture of other builders' carpentry and joinery; C16.2.4 Manufacture of wooden containers.

54. NACE codes: C23.1.1 Manufacture of flat glass; C23.1.2 Shaping and processing of flat glass; C23.1.4 Manufacture of glass fibres.

55. Construction Workforce Outlook (2024). Labour Market Intelligence Report 2025-2029. Available at: https://www.citb.co.uk/cwo/index.html

56. UK Steel (2024). UK Steel Key Statistics Guide 2024. Available at: https://www.uksteel.org/steel-news-2024/key-stats-2024

57. Ibis World (2026). Cement Manufacturing in the UK - Employment (2013–2032). Available at: https://www.ibisworld.com/united-kingdom/employment/cement-manufacturing/1315/

58. Forest Research (2024). Forestry Statistics 2024. Chapter 7: Employment & Businesses. Available at: https://www.forestresearch.gov.uk/tools-and-resources/statistics/publications/forestry-statistics/forestry-statistics-2024/2024-7-employment-and-businesses

59. Glass & Glass Product Manufacturing in the UK - Employment (2011–2031). Available at: https://www.ibisworld.com/united-kingdom/employment/glass-glass-product-manufacturing/200163/

60. Eurostat (2026). Enterprises by detailed NACE Rev. 2 activity and special aggregates. Available at: https://ec.europa.eu/eurostat/databrowser/view/sbs_ovw_act/default/table?lang=en

61. Eurostat (2026). Employees by migration status and employment contract. Available at: https://ec.europa.eu/eurostat/databrowser/view/lfsa_eegatm/default/table?lang=en

62. International Labour Organisation (2016). Migrant work and employment in the construction sector. Available at: https://www.ilo.org/media/428776/download

63. European Labour Authority (2023). Undeclared work in the construction sector. Available at: https://www.ela.europa.eu/sites/default/files/2023-12/UDW-learning-paper_undeclared-work-construction-sector.pdf

Table 4 Employment trends at country level for women, youth and migrant workers in the broad construction sector

	Employment of women	Employment of Youth	Share of documented migrants in employment
Germany	Only 14% of workers are women overall (2.2% of in core construction trades; 28% in planning, 29% of engineers).	10% of workers are under 25, with higher youth representation (15%) in finishing trades.	22% of employees in core construction have foreign nationality. The employment growth since 2022 has been driven exclusively by migrant workers (mainly from Eastern Europe).
France	13% of workforce	No data	27% of non-qualified construction workers
Spain	Women make up 8.8% of the workforce (2023). Higher female representation in civil engineering (13.2%) and technical/administrative roles.	Only 9% of workers are under 30, declining from 15.1% since 2012.	22.9% of workers are foreign nationals (from Latin America (43%) and other parts of Europe (26.4%).
Poland	In 2020, almost 13% of employed workers in the construction sector were women (excl. self-employed individuals).	15 – 24 year olds account for 6.9% of the workforce.	No data
Italy	Women account for only 8% of the total workforce (~130,000 workers).	Younger workers aged 15–34 represent only 20% of the total workforce (~321,000).	Foreign workers account for roughly 17%.
Netherlands	Women hold only 10% of construction jobs, and just 0.25% of on-site workers are female. Four out of five technically trained women leave the sector.	No data	In 2020, 56,000 foreign workers were employed, representing ~18% of the total workforce. Most of them are from Central and Eastern Europe (35% from Poland, 14% from Bulgaria, 14% from Romania) and Turkey (20%).
Czechia	No data	No data	No data
Denmark	Women constitute around 9-10% of the construction workforce.	Youth employment (ages 15–24) in construction remains robust, but the overall sector is influenced by the broader ageing demography.	Migrant workers accounted for 13% of the workforce between 2016–2022 with most coming from Poland, Romania and Lithuania, with migrant workers from outside the EU are also growing.
Ireland	5% women in 2023.	No data	Share of migrant workers (15%) was slightly below the national average of 17%, while 85% of workers were Irish nationals.
Ireland	187,008.	45,341.	1,279.
UK	Constitute approximately 15% of workers in the sector, and make up around 2% of those working on-site in trades – increasing trend.	Only 19% of workers under the age of 25.	No data
Source: Aggregated data from country fiches (Annex I)			

Within the **steel, cement, timber and glass industries**, the **workforce characteristics are more diverse**. For example, in the German steel sector, 10% of workers are women, while estimates for the timber sector reach up to 35%, depending on the segment. Also in the UK, the timber sector workforce is made up of 44% women.

Information on the share of migrant workers in the building material sectors is hardly available. However, there are signs of migrant workers being less common than in the on-site construction sector. For example, the French glass industry relies almost exclusively on local workers. The average age of workers in the building material industries seems to be quite high (e.g., 45.9 years in steel in the Netherlands), due to higher educational levels required (see below). Therefore, youth employment in the building material industries is low.

The required **educational levels** of workers vary across sectors and roles. Architectural and engineering services require higher education and digital skills, while on-site construction and manual trade workers have primary to lower secondary education. Overall employment trends show a shift toward higher-skilled roles. In the last decades, the demand for workers with less than primary to lower secondary education decreased considerably (from 2.6 million in 2006 to 1.6 million in 2022), while there is stable employment among those with upper secondary and post-secondary non-tertiary education (around 3.3 to 3.7 million), and a steady rise in tertiary-educated workers (from 1 million to 1.25 million). Key occupations require European Qualification Framework (EQF) Level 4-6 qualifications, while engineers and architects demand Level 6-8. Skills in demand include green (e.g., insulation, heat pumps), digital (e.g., Building Information Modelling (BIM), Computer-Aided Design/Manufacturing (CAD/M)), and transversal skills (e.g., regulatory knowledge, teamwork). Within building material sectors, most workers (in the steel and glass sectors) possess technical and vocational training (corresponding to EQF level 4 and higher).

Training participation among construction employees in the EU has increased over recent years, peaking at 9.9% in 2023, reflecting a renewed focus on skills development. However, tertiary education and Vocational Education and Training (VET) have not kept pace with job vacancies.[64] The specific training needs vary significantly across countries and roles. Based on a 2020 European Commission EU-level study, it was expected that the demand for high-level qualifications would double by 2025, accounting for one-third of all jobs. Despite this, enrolment in construction degrees declined, particularly at bachelor's and master's levels.[65]

1.3 The role of collective bargaining

Collective bargaining is **key to safeguarding the rights of workers** in both the on-site construction sector and in the production of materials and products used in construction. Collective bargaining can cover issues such as pay setting (minimum rates of pay, actual rates of pay and bonuses) and can also govern the procedures to be followed in situations of restructuring. Many collective agreements at national, sectoral and company-level contain provisions relating to subcontracting, governance, dispute resolution, individual dismissal and collective redundancy, providing an additional layer of security on top of relevant legislation. In some sectors, such as construction, however, there is a lower coverage of collective bargaining or collectively agreed workers' rights, due to the predominance of SMEs and the fragmentation of the sector. In construction, therefore, legislation and fundamental rights such as Freedom of Association play a key role in helping to ensure workers' rights during transition. It should also be noted that the EU has taken steps to ensure workers' rights in recent years, for example in the 2022 Directive on Adequate Minimum Wages[66]. This Directive aims to ensure fair pay and boost collective bargaining coverage by requiring Member States with low collective bargaining coverage to create national action plans to strengthen sectoral bargaining and social partner capacity.

Across our countries of focus, we see **various models** of collective bargaining. In Germany, Denmark and Spain, collective bargaining predominantly takes place at the national sectoral level. In France, although sectoral collective bargaining exists, underpinned by a national minimum wage, actual rates of pay are more likely to be determined at the company level. The state plays a significant role in the protection of workers' rights in France, through a comprehensive framework of labour legislation. In the UK, collective bargaining is very decentralised, almost exclusively taking place at the company level, with the exception of the engineering construction sector, which is covered by a national sectoral agreement. Decentralised bargaining is also common in most of the Central and Eastern Member States.

64. Ibid.

65. European Construction Sector Observatory (2020). Analytical report on Improving the human capital basis. Available at: https://single-market-economy.ec.europa.eu/system/files/2021-02/ecso_ar_human_capital_2020_0.pdf

66. European Union (2022). Directive (EU) 2022/2041 of the European Parliament and of the Council of 19 October 2022 on adequate minimum wages in the European Union. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32022L2041&qid=1730139824496

In countries where sectoral collective agreements are not common, such as the UK and Central and Eastern Member States, the large majority of construction companies are not covered by collective bargaining.

Collective bargaining coverage in the construction industry is low due to high levels of subcontracting and self-employment. **Long subcontracting chains** are common in the construction sector in many countries. This can be problematic for the protection of workers' rights, as it is not always clear who the employer is and who has the responsibility for workers' employment rights. This, in turn, hampers the social partners' ability to protect workers, improve working conditions and prevent potential abuses of working conditions. Direct employment is therefore a preferable arrangement in terms of protecting workers' rights, as it provides more transparency. Trade unions such as the EFBWW campaign to limit subcontracting and to reduce exploitation of workers[67].

These different collective bargaining agreements are likely to **impact the way that transitions for workers in construction will develop**. In some countries, collective agreements include provisions such as skills development to enable workers to obtain the right types of skills to operate in the future green economy. An example of this is Czechia, where the collective agreement for the construction sector obliges employers to ensure the professional development of employees through induction training, on-the-job training, practical apprenticeships and deepening of qualifications. In the Netherlands, agreements at the company level and at the sector level in the metalworking and electrical engineering industry include agreed training and transition provisions. Trade unions often cite advocating for fair working conditions in the context of the climate transition as a core activity, such as in the case of the metalworkers' union IG Metall in Germany, which represents workers in sectors such as steel and timber.

Practices within the **industries** that supply building materials to the construction sector differ. In the case of the **steel** sector, there is traditionally strong trade union engagement at the national level, and collective bargaining plays a central role in supporting workforce adaptation and protecting workers during restructuring events. In Italy, for example, trade unions use sectoral agreements and social dialogue to advocate for integrating green skills into vocational training, ensuring fair working conditions during the decarbonisation process, and supporting job security for workers affected by industrial transformation, as in the steel industry in the region of Taranto. In the case of the **cement** sector, social dialogue and collective bargaining mechanisms are widely used to support the workforce during transition and restructuring. In the UK, the Mineral Products Association, which represents large cement companies, recognises the need to focus on trying to fill skills gaps, particularly in the area of CCS, alternative fuels and digitalisation. It is also working to ensure that skills are aligned with the UK's decarbonisation milestones through actions such as reskilling and upskilling, apprenticeships, knowledge transfer, and coordinated partnerships between industry and education providers. In the timber sector, the role of collective bargaining varies. In Germany, for example, collective bargaining plays an important role, and there is a strong apprenticeship system to support workforce adaptation in Germany, whereas in the UK, bargaining is largely confined to individual agreements at the company level. In the **glass** sector, in Spain and France, collective and plant-level bargaining agreements and social dialogue mechanisms play a central role in ensuring wage and safety guarantees and supporting retraining

2.0 Policy-driven construction decarbonisation and its impacts

EU institutions and national governments have, in recent years, passed a number of policies to mitigate pressing climate change effects. These strategies have a significant impact on workers in the construction sector and its supply chain. Achieving the climate goals set will require significant restructuring of labour markets. In addition, demographic changes occurring globally are resulting in a mismatch between the availability and demand of workers geographically, while technological developments also fundamentally change labour market demands[68].

67. EFBWW, ETUC. Who's the Boss - Stop exploitation in subcontracting chains. Available at: https://limitsubcontracting.eu/

68. International Organisation for Migration (2023). Migration and Just Transition. Available at: https://www.iom.int/sites/g/files/tmzbdl2616/files/documents/2024-05/information-sheet-migration-and-the-green-and-just-transition.pdf

2.1 Emission reduction targets and the legislative framework for decarbonising the built environment

2.1.1 The EU policy framework

At the EU-level, the **decarbonisation of the construction sector** and its supply chains is anchored in the European Green Deal and accompanying Fit for 55 package, which sets the EU on a path to climate neutrality by 2050 and mandates a 55% reduction of greenhouse gas emissions by 2030 compared to 1990 levels. Within this framework, **several key legislative instruments shape the transformation of the on-site construction industry and industries supplying building materials.**

Box 2 EU policy framework for the decarbonisation of the on-site construction industry

- **Renovation Wave Strategy**: This strategy, passed in 2020, aims to reduce buildings' GHG emissions by 60%, their final energy consumption by 14%, and energy consumption for heating and cooling by 18%. Furthermore, it aims to double the annual energy renovation rate to at least 2% by 2030. It targets the renovation of 35 million buildings across the EU and emphasises improving energy efficiency, reducing emissions, and creating new employment opportunities. The strategy also addresses energy poverty and prioritises renovations in public buildings and housing stock.
- **Green Public Procurement (GPP)**: This legislation sits within the framework of **Strategic Public Procurement**, together with **Socially Responsible Public Procurement** and **Innovation Procurement**. The basic concept of GPP relies on having clear, verifiable, justifiable, and ambitious environmental criteria for products and services, based on a life-cycle approach and scientific evidence base. According to the European Commission's work programme for 2026, a revision of the Procurement Directive is expected in the second quarter of 2026.
- **Energy Performance of Buildings Directive (EPBD)**: The revised EPBD sets ambitious goals for decarbonising the building stock by 2050. Key provisions include:
  - Reducing energy consumption in buildings by 11.7% by 2030, compared to 2020 projections for 2030.
  - Renovation of the worst-performing residential and non-residential buildings by 2030–2033.
  - Zero on-site fossil fuel emissions for new buildings by 2030 (2028 for public buildings).
  - Mandatory solar-readiness for new buildings and deployment of solar panels on large public and non-residential buildings undergoing renovation.
  - Phase-out of fossil fuel boilers and improved electric vehicle charging infrastructure.
  - Introduction of Minimum Energy Performance Standards and alignment with the CPR to ensure sustainability and safety of building materials.
  - Requirements for the calculation and disclosure of the life-cycle emissions of buildings (for new buildings of >1000m^2 from 2028 and for all new buildings from 2030).

- **Circular Economy Action Plan** (2020): One of the key pillars of the European Green Deal, it covers the entire product life cycle through a mix of legislative and non-legislative measures. It includes several actions targeting the construction sector, such as:
  - Enhancing the sustainability of construction products through the revision of the CPR, potentially introducing requirements on recycled content.
  - Promoting building durability and adaptability, alongside the development of digital building logbooks.
  - Revising material recovery targets for construction and demolition waste.
  - Launching the Renovation Wave to significantly boost energy efficiency.
  - Expanding the Ecodesign Directive into the Sustainable Products Initiative.

Box 3 EU policy framework for the decarbonisation of selected building material industries

- The **Industrial strategy for Europe**: Updated in May 2021 to include lessons learnt from the COVID-19 crisis, it focuses on the following key areas: dealing with the EU's strategic dependencies; strengthening the resilience of the single market and accelerating the green and digital transitions.
- The **Clean Industrial Deal** (2025): It prioritises critical raw materials, with initiatives including Clean Trade and Investment Partnerships to diversify supply chains, alongside measures to simplify and enhance the CBAM.
- The **Green Deal Industrial Plan** (2023): It enhances the competitiveness of Europe's net-zero industry and is accelerating the transition to climate neutrality. It does so by creating a more supportive environment for scaling up the EU's manufacturing capacity for the net-zero technologies and products required to meet Europe's ambitious climate targets.
- The revised **Construction Products Regulation** (2025): It promotes the digitalisation of the construction industry through the introduction of Digital Product Passports, and supports innovative and sustainable construction techniques such as prefabricated or modular elements. It also encourages greater use of off-site construction methods to reduce costs, accelerate the delivery of housing, and cut construction waste by 10-15% during production and manufacturing.
- The **Carbon Border Adjustment Mechanism** (2024): It is the EU's tool to put a fair price on carbon emitted during the production of carbon-intensive goods that are entering the EU, and to encourage cleaner industrial production in non-EU countries. The EU aims to prevent carbon leakage from companies moving high carbon production abroad. It will apply in its definite regime in 2026. The gradual introduction is aligned with the phase-out of free allowances under the ETS to support the decarbonisation of EU industry.
- The **Steel and Metals Action Plan** (2025): This plan sets out the short- and medium-term work programme to strengthen the competitiveness of Europe's steel and metals industries. One of its key pillars focuses on promoting circularity in the metals value chain and safeguarding high-quality industrial employment. Among its various measures, the plan foresees the extension of the CBAM to cover selected downstream steel and aluminium products and the enhancement of steel scrap availability, which is a critical input for steel production, including in the construction sector.

- The **Critical Raw Materials Act** (2023): As part of the Green Deal Industrial Plan, it seeks to reinforce all stages of the EU's critical raw materials value chain, diversify import sources to reduce strategic dependencies, enhance the EU's capacity to anticipate and manage supply disruptions, and promote greater circularity and sustainability.
- The **Circular Economy Act**: Scheduled for adoption in 2026, it aims to create a Single Market for secondary raw materials, enhance the availability of high-quality recycled materials, and stimulate their demand across the EU.

2.1.2 Decarbonisation of construction in country-level policy frameworks

EU Member States have set their **emission reduction targets** in alignment with EU frameworks (see above), while the UK has set reduction targets in its National Determined Contribution in alignment with the Paris Agreement. Commitment to these targets and EU-level decarbonisation policies has led to **national-level legislation, strategies and funding mechanisms** that are driving the decarbonisation of construction and building material industries. While all EU Member States have adopted so-called National Building Renovation Plans[69] to achieve a highly energy-efficient and decarbonised building stock by 2050 through measures for public buildings, housing, and enterprise-level energy efficiency requirements, there are other key policies across our focus countries with specific impacts on the built environment.

Box 4 Key country-level policies for the decarbonisation of the construction sector

Long-Term Strategy for Building Rehabilitation (2020)

This strategy aims for full building decarbonisation by 2050 through cost-effective retrofits, heat pump deployment, and intersectoral collaboration. It forecasts deep rehabilitation of 7.1 million dwellings by 2050.

Buildings Energy Act (2020)

This law sets binding energy performance standards for new and existing buildings. It requires newly installed heating systems to cover at least 65% of demand with renewable energies.

National Low-Carbon Strategy – SNBC-2 (2020)

This strategy aims to rapidly decarbonise the building sector by cutting emissions by 49% until 2030, fully decarbonising by 2050, and massively scaling up energy renovations to 700,000 per year. It focuses on improving both existing and new buildings through better insulation, efficient heating and cooling systems, renewable energy installations, and increased use of low-carbon materials, supported by strict regulations and professional upskilling initiatives.

Carbon Budget and Growth Delivery Plan (2025) and the Powering Up Britain policy paper (2023)

These initiatives collectively outline sector-specific pathways for emissions reduction across energy, transport, buildings, and industry. In the area of buildings, the Carbon Budget and Growth Delivery Plan will focus on providing more efficient, low-carbon buildings, reduced energy bills and healthier, more comfortable environments. The government will also provide funding and support to businesses and consumers to upgrade their commercial spaces and homes. The Powering Up Britain policy paper aims to reduce reliance on fossil fuels to heat buildings and aims to increase energy efficiency across the built environment.

69. Previously known as Long-term Renovation Strategies, which EU Member States are required to submit since 2014 as per the EPBD.

Technical Conditions for Buildings (2022)

This law implements the EU's EPBD and requires all new buildings from 2021 to be nearly zero-energy buildings (NZEB). The regulation specifies values of maximum primary energy demand and permissible heat transfer coefficient for specific types of buildings. Furthermore, it defines the maximum primary energy demand and thermal insulation standards.

Strategy for Sustainable Construction (2021)

This policy sets a national framework to cut the climate impact of construction through strict CO_2 limits, lifecycle-based regulation, and circular economy principles. It mandates life-cycle assessments for all new buildings, promotes recycled materials, and introduces progressively tighter CO_2 thresholds-starting in 2023 for large buildings and extending to all new construction by 2025. Effective since July 2025, a Supplementary Agreement further tightened these limits to 7.1 kg CO_2e/m^2/year for all new buildings.

2.2 Impacts on supply chain, production and investments

EU climate and energy policies are reshaping supply chains, production patterns and investment flows in the construction sector, with building renovation emerging as a central driver of change.

The Renovation Wave and the EPBD, under the broader framework of the European Green Deal, are expected to significantly increase demand for energy-efficient renovation works, technologies and materials, while stimulating investment across the construction value chain. By prioritising the upgrade of the existing building stock, most of which will still be standing in 2050, these policies shift activity towards large-scale renovation, maintenance and retrofitting. This transformation is expected to affect suppliers, contractors and workers through increased demand for compliant construction products, integrated energy solutions and skilled labour across renovation-related activities.

More specifically, the **Renovation Wave** aims to at least double the current annual energy renovation rate from around 1% to 2% by 2030, while increasing the depth of renovations and energy efficiency gains, with an estimated target of renovating 35 million buildings over the decade. Early estimates from the European Commission suggested the creation of around 160,000 additional jobs in construction[70], while more recent estimations by EFBWW and ITUC put the number at closer to 1.5 million[71].

The EPBD sets binding targets to **decarbonise the EU building stock by 2050**, including minimum energy performance standards, renovation of the worst-performing buildings, the phase-out of fossil fuel boilers, and increased deployment of solar energy and electric vehicle infrastructure, all of which are expected to intensify demand for renovation works.

The **Minimum Energy Performance Standards** will reshape demand for building components, prioritising high-performance insulation, energy-efficient heating/cooling systems, low-carbon heating systems (e.g., heat pumps), smart energy management solutions and the possibility to install small-scale renewable energy installations (e.g., solar PV). Several national policies support housing construction to address affordability, and together with expected EU-level policies on affordable housing[72] they will create additional demand in the sector. However, these new constructions will need to align with high standards on energy efficiency and performance and therefore carried out by skilled workers.

Achieving these policy objectives requires **substantial investment**. It is estimated that around €275 billion of additional investment per year is needed for building renovation to meet the 2030 climate target[73]. While EU funding instruments, including cohesion policy funds, the Multiannual Financial Framework and the Recovery and Resilience Facility, are mobilising significant resources for renovation of public buildings, housing and energy efficiency, most

70. European Commission: Directorate-General for Employment, Social Affairs and Inclusion, Employment and social developments in Europe (2019) Sustainable growth for all – Choices for the future of Social Europe.

71. ITUC (2023). More than two million workers will be needed in the construction sector in Europe by 2030. Available at: https://www.ituc-csi.org/more-than-two-million-workers-will-be-needed-in-the-construction-sector-in-europe-by-2030

72. Expected policies include: the European Affordable Housing Plan, a pan-European investment platform for affordable and sus-tainable housing and a European Strategy for Housing Construction.

73. Buildings Performance Institute Europe (2022). Report on the evolution of the European regulatory framework for buildings efficiency. Available at: https://www.bpie.eu/wp-content/uploads/2022/02/rev6_SPIPA_EU.pdf

national long term renovation strategies do not allocate dedicated funding for worker upskilling and reskilling. This creates a risk that labour and skills shortages could constrain the capacity of supply chains and production systems to deliver the required scale of renovation in a just and timely manner.

New regulations, financial and other incentives towards building renovations with a focus on energy efficiency **significantly impact investments, production and the construction supply chain overall**. Many of these measures are announced overnight and are short-lived, exacerbating demand and driving prices up for specific products and services that cannot be sustained when incentives stop. This phenomenon is described within the context of the UK as "short-termism", which can be observed both in production and in employment (analysed in section 2.3). For example, European policy documents created high expectations on the installation of heat pumps that were not met with a corresponding level of demand. As a result, companies producing them faced massive drops in sales, despite high production. To allow the market to adjust to policy and offer products and services that will serve decarbonization in the long term, strategies, laws, and incentives need to be consistent and operate in the medium and long term.

Policies focusing on the renovation of existing buildings and the increased hybrid approach to building (focusing on pre-fabrication and timber elements) may cause the volume **of materials** and products (particularly steel and cement) needed to shrink. Meanwhile, the timber industry may benefit from the transition – as will the production of other **energy-efficient materials and low-carbon products**. At the same time, the revised CPR will also affect steel, cement, timber and glass as it introduces enhanced circular economy marking, digital product passports, and mandatory environmental reporting for key products. Especially the latter will push producers to invest in sustainable technologies and materials, and adopt circular and cleaner production methods to reduce energy consumption. These approaches can shorten supply chains within regions, extend material lifecycles, and reduce dependency on volatile global markets -lowering costs and enhancing resilience. The new CPR also supports prefabrication, which is gaining ground as a viable alternative to traditional on-site construction.[74]

The turn to **off-site construction and the prefabrication of elements** disassociates the location of the building being constructed or renovated from the place where its elements are fabricated. This may, in turn, disassociate the location of at least some of the workers involved. Prefabrication in construction supports resource efficiency, including time and budget, and can reduce delays, costs, disturbance to neighbours through noise, air and pollution. Incentives to establish factories of prefabricated construction elements in regions in transition could help reabsorb the workforce. Though the new CPR incentivises off-site construction, it will depend on Member States and regional governments to support deployment, potentially in combination with smart specialisation strategies and other support to regions in transition.

Regional shifts are expected to emerge as on-site construction and industries decarbonise. Regions with strong industrial hubs and better access to renewable energies, CCS technology and industrial symbiosis[75] across multiple sectors (e.g., Germany, Poland, France, Spain, and Czechia) stand to gain more than stand-alone factories that may be less well-positioned for the transition to low-carbon products. Within the **steel sector**, many workers are based in traditional steel towns or regions dependent on a single large steel plant. New green jobs (e.g., in hydrogen hubs, electrolysis plants, or modernised steel facilities) may emerge in different locations, depending on whether existing plants require moderate retrofits or full restructuring. For instance, the steel plant in Taranto, which will require a deep restructuring, may not be able to retain all jobs, causing workers to move into Northern Italy, where steel plants in Lombardy or Veneto would only require minor retrofits. Similarly, in the **cement industry**, regions with the highest concentration of carbon-intensive facilities may face closures or significant downsizing. In France, for example, plants in Centre-Val de Loire and Indre-et-Loire face transition risks, while job creation is more likely in regions investing in green cement technologies, recycling, or CO_2 capture (e.g., Hauts-de-France, Occitanie, Auvergne-Rhône-Alpes). A similar pattern is seen in Czechia, where traditional cement production is concentrated in Moravia, Bohemia and the Prague outskirts, while green investment financed by the Just Transition Fund is focused on regions such as Ústecký,

74. DG GROW (2025). Market potential of offsite construction for housing supply. Available at: https://op.europa.eu/en/publication-detail/-/publication/33979417-5882-11f0-a9d0-01aa75ed71a1/language-en

75. Industrial symbiosis encompasses initiatives in which two or more industrial entities develop mutually beneficial relationships. Most common is the case that one entity makes productive use of a material stream that is regarded as waste by another entity. Definition based on Chertow (2000), Lombardi & Laybourn (2012).

Karlovarský and Moravskoslezský. For the **on-site construction sector**, urban areas attract more investment and innovation, while rural regions risk being left behind with fewer business opportunities. Cross-border mobility is expected to remain constrained by qualification recognition and language barriers. Regional shifts will have significant effects on migration patterns within Europe.

2.3 Impacts on employment, workforce composition and skills

The EU and national decarbonisation policies are also set to significantly impact employment numbers in the on-site construction sector and building material industries, including changes to the composition of the workforce and the types of skills that are likely to be needed.

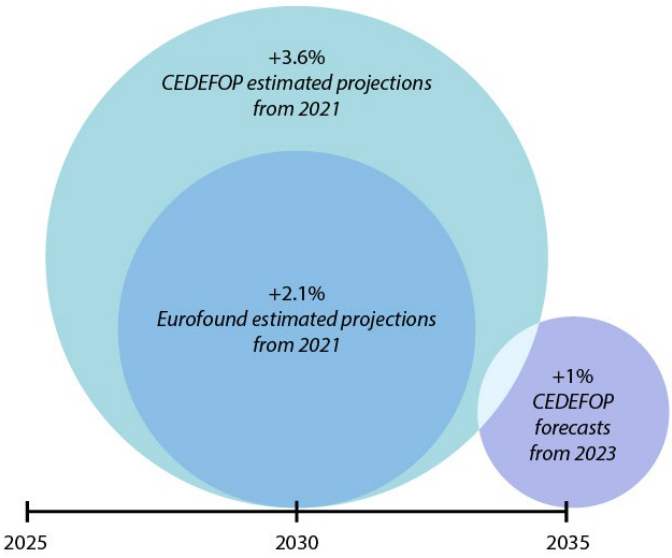


Figure 4 Employment projections in the construction sector

Employment projections for the construction sector are largely optimistic, suggesting that the renovation wave and green transition, paired with retirements and other reasons for people leaving their jobs, will lead to **net job creation in the construction sector** by 2030. In 2021, CEDEFOP[76] estimated that energy efficiency investments powered by the European Green Deal could increase construction employment by around +3.6% by 2030 compared to baseline scenarios. Equally, the 2023 Eurofound analysis of the Fit for 55 package projects an additional 312,000 construction jobs (+ 2.1%) by 2030 beyond baseline trends, driven mainly by energy efficiency and green transition investments[77]. In April 2023, CEDEFOP[78] published forecasts suggesting that total employment in construction may potentially decline by around 1% between 2021 and 2035, equivalent to a loss of approximately 180,000 jobs. However, the latest data from December 2023 reinstated the earlier **net employment growth rates, combined with very high replacement needs**. An estimated 4.1 million people will be needed to replace those who are expected to leave the occupation (due to retirement and other reasons), and another 88 thousand people will be needed to fill new job openings, resulting in an increase of around 1% net employment between 2022 and 2035.[79]

Renovation Wave–specific estimates, based on a renovation rate of 2% of the building stock, also point to substantial employment needs in building renovation, particularly in renovation-related manual, technical and professional occupations[80]. In the renovation sector alone, more than one million workers are expected to retire between 2023 and 2030, making recruitment and skills availability a central challenge for delivering the renovation wave. Amongst the countries analysed in this study, steady and moderate growth in labour demand is expected, though it is, in some cases, regionally focused: in Italy, for example, higher labour demand is expected in the North; in the Netherlands, growth is expected around the capital region (Randstad).

In terms of **skills**, the green (and digital) transition will require significant skills development from workers. While all workers in building construction and renovation will need some form of basic climate literacy, there are specific new skills required that can be categorised into the following.

76. CEDEFOP (2021): The green employment and skills transformation: Insights from a European Green Deal skills forecast scenario. Available at: https://www.cedefop.europa.eu/en/publications/4206

77. Eurofound (2023). Research report: Fit for 55 climate package: Impact on EU employment by 2030. Available at: https://www.eurofound.europa.eu/en/publications/all/fit-55-climate-package-impact-eu-employment-2030

78. CEDEFOP (2023). The greening of the EU construction sector: skills intelligence data insight. Available at: https://www.cedefop.europa.eu/en/data-insights/greening-eu-construction-sector#_future_outlook.

79. CEDEFOP (2023). Construction workers: skills opportunities and challenges (2023 update). Available at: https://www.cedefop.europa.eu/en/data-insights/construction-workers-skills-opportunities-and-challenges-2023-update

80. EFBWW (2023): Skills and quality jobs in construction in the framework of the European Green Deal and the post-Covid recovery. Available at: https://www.efbww.eu/publications/reports-and-studies/skills-and-quality-jobs-in-construction-in-the-framework-of-the/2849-a

Skills category	Specific areas	Countries where demand is high
Energy efficiency skills	Insulation, retrofit, air tightness, ventilation, heat pumps, renewable energy integrations through e.g., photovoltaics, smart home and automation, geothermal, smart meters, aerothermal energy.	PL, DE, FR, IT, NL, IE, CZ, UK.
Digital skills	Use of CAD, other dedicated software, Building Information Modelling (BIM), geolocation.	PL, DE, FR, IT, ES, NL, IE, CZ, UK.
Circular economy skills	Design for circularity, recovery and reuse of construction waste, waste disposal.	NL, DK.
Transversal skills	Regulatory compliance, project coordination.	All.

Source: Aggregated data from country fiches (Annex I).

Other skills mentioned were pre-fabrication skills (DE) and the emergence of specific jobs such as green building assessors and energy auditors/certifiers (IT, ES). It is estimated that particularly in the area of energy efficiency, **35-45% of the construction and renovation workforce will need to receive training** to adapt to constantly evolving requirements. To be effective and useful to SMEs, training content should be tailored to the occupational needs and profiles of workers (i.e. bricklayers, electricians, roofers, plasterers and glaziers, insulation workers, plumbers, carpenters and joiners and technicians).

The **workforce composition** within the overall construction sector is set to change, along with changes in the demand for buildings and skills. Digitalisation and automation are expected to reshape workflows at construction sites, with reductions for on-site roles and increases in factory-based workers for construction components and prefabricated elements (off-site construction), as well as tech-driven roles (including robot/drone operators and sensor installation/maintenance). For this reason, a **shift is expected from low-skilled workers to skilled trades and technical roles,** alongside managerial profiles with integrated technical (such as computer-aided design and manufacturing) and soft skills.[81] Figure 3, which is based on CEDEFOP data, shows the employment shares of key occupations in the broader construction sector and expected shifts by 2035. While in 2022, on-site construction workers still made up over 40% of all workers in the sector, this share is set to decrease to less than 38% by 2035. Instead, trades such as construction engineering technicians/professionals, business administration roles and construction managers are set to increase their employment share in the construction sector.[82] Within and beyond these, green jobs in the following areas are expected to emerge: pre-fabrication/off-site construction; energy certification/assessment; and construction with bio-based materials (wood, hemp).

81. European Construction Sector Observatory (2022). Construction Blueprint Report - Skills needs analysis in the construction industry. Available at: https://www.constructionskillsobservatory.eu/assets/documents/SkillsNeedsAnalysis.pdf

82. CEDEFOP (2023). Greening of the construction sector- Future outlook. Available at: https://www.cedefop.europa.eu/en/data-insights/greening-eu-construction-sector#_future_outlook

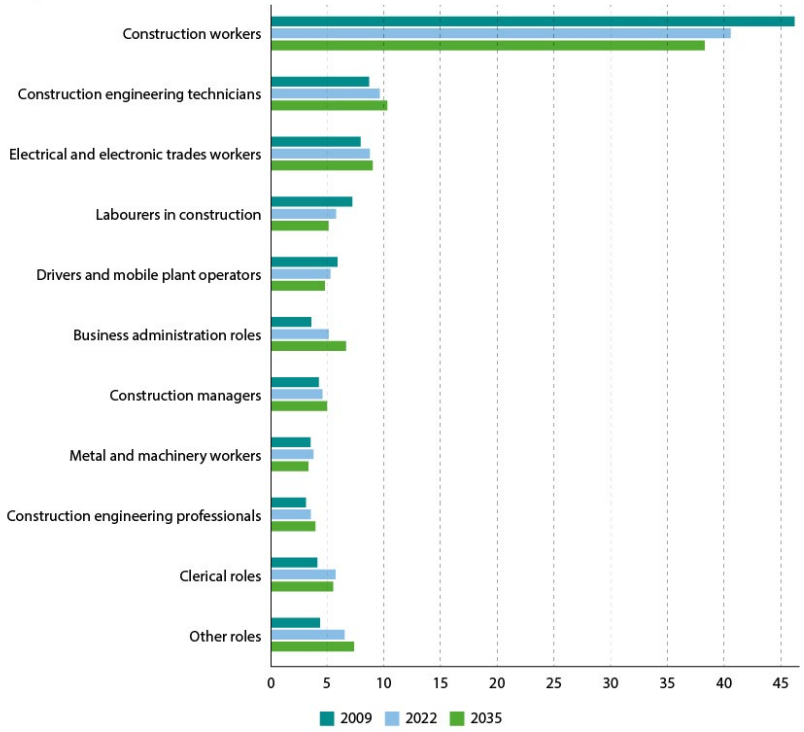


Figure 5 Employment shares of key occupations in construction (in %)

At the **country level**, it is also recognised that low-skilled occupations (i.e. on-site construction workers and other manual/physically demanding trades) are set to decrease, along with traditional masonry (e.g., expected to decrease in France and the UK). As these jobs are usually completed by micro companies and SMEs, these changes in occupations may reinforce the domination of larger companies in the construction market. According to the interviews carried out for this research, it is expected that the most skilled workers will be absorbed in new developments and larger-scale construction projects, while less skilled workers from manual trades (e.g., plumbers, bricklayers) will adapt to small-scale renovation-focused work. The country-level research also confirms that professionals with tertiary-level education, skilled in retrofitting and energy efficiency, as well as material reuse and management, will be most in demand.

The Renovation Wave and broader green transition are reshaping the skills profile required in the construction sector, with emerging demand for specialised and cross cutting competencies tied **to energy efficiency, circular economy and digitalisation**. As buildings are retrofitted to meet energy performance standards, there is heightened demand for occupations directly involved in renovation processes, including skilled manual trades, energy auditors, certifiers, inspectors, site supervisors, architects and engineers. These roles require both foundational construction skills and new competencies related to assessing and improving building energy performance. The Construction Blueprint[83] project identified bricklayers, carpenters, electricians, plasterers, plumbers and site supervisors as among the professional profiles needing upskilling in green and digital skills to respond to evolving renovation needs.

Technical barriers[84] to broad uptake of energy renovations stem from **gaps in workforce competencies** and the availability of solutions that simplify complex renovation tasks. Many construction workers currently lack the ability to interpret technical renovation information or evaluate energy efficiency opportunities, and may not possess sufficient understanding of new technologies or building infrastructure required for deep renovation. Standardised tools and methodologies for energy performance evaluation are not yet widespread across Member States, limiting the transferability of skills and hindering quality assurance in renovation work. Addressing these gaps will require more systematic training and clearer occupational frameworks that integrate energy efficiency, digital tools and circular economy principles into core competencies.

83. CEDEFOP (2019). Construction Blueprint. Sectoral strategic approach to cooperate on skills in the construction industry. Available at: https://www.cedefop.europa.eu/en/project-fiches/construction-blueprint-sectoral-strategic-approach-cooperate-skills-construction-industry

84. CEDEFOP (2023). The greening of the EU construction sector: Skills intelligence data insight. Available at: https://www.cedefop.europa.eu/sv/data-insights/greening-eu-construction-sector

Across the sector, training needs span several categories. Specialised energy efficiency training is required for those directly handling energy renovation technologies and materials. According to the *Skills and quality jobs in construction* report[85], an estimated **3.1 to 4.5 million workers need energy efficiency training**, while over nine million need basic climate and circular economy skills to support sustainable renovation and reduce resource impacts. Basic climatic literacy and awareness of circular economy principles are important across roles, from non-specialised staff to managers, to ensure that energy saving practices are implemented comprehensively on site and throughout project lifecycles.

Occupational safety and health (OSH) training is another essential area of skills demand. With increased activity on renovation sites, there is a corresponding need for more OSH specialists and labour inspectors, and for all workers to be trained in safe practices specific to energy renovation. EFBWW's *Skills and quality jobs in construction* report [86]highlights the potential requirement for tens of thousands of OSH managers and inspectors to support the scaling up of renovation activity[87]. Social partners highlight the new OSH risks associated with renovation work, in particular exposure to asbestos, silica and other hazardous materials.

Soft skills and broader competencies are also gaining importance in the renovation sector. EU surveys and job vacancy data show that skills such as communication, teamwork, adaptability and responsibility are critical for coordinating complex renovation tasks, especially as digital tools and new workflows become more prevalent on site. Construction workers increasingly must collaborate across disciplines, manage more integrated project information, and engage effectively with clients, regulatory requirements and diverse technical teams.

Finally, the impending replacement demand due to **retirement** (with projections of over 1.25 million renovation workers retiring by 2030) amplifies skills and recruitment challenges. This demographic shift underscores the need not only for new entrants with relevant renovation competencies but also for continuous upskilling and reskilling of existing workers. European initiatives such as the Pact for Skills and the Construction Blueprint aim to bridge skills gaps by promoting training in energy efficiency, circular economy and digitalisation, and by fostering cooperation between employers, training providers, and public authorities.

These expected shifts could increase the **attractiveness of the broader construction sector** as an employer, especially towards youth and women, whose current representation is low. The general reputation of the sector as male-dominated, low-tech, physically demanding and unreliable in terms of contracts and payments could improve as the ways of working and available technologies transform it. At the same time, what might happen with migrant workers is not as obvious. While requirements for formal knowledge and skills increase, and work environments formalise (from the construction site to a prefabrication factory), attention needs to be given to the appropriate integration of these workers, and to the respect of their labour rights. It also is important to note that there is conflicting evidence[88] on the wide spread quality of green jobs in construction compared to brown jobs.

Within the **building material industries**, the **impacts** of decarbonisation policies on employment numbers look different in each sector. Within the steel and cement sectors, most countries expect job losses of up to 20% and stagnation in traditional steel and cement production due to decarbonisation and automation. In terms of necessary **skills and changes in workforce composition**, knowledge in the area of low-carbon technologies and digitalisation will be key for future jobs. Here, it is important to note that digitalisation and automation, as well as consolidation and cost-pressure, exacerbate job losses in the whole economy, especially for low-skilled roles[89], and such job losses should not be associated with decarbonisation, at least not solely.

85. European Commission (2025). Skills and quality job in construction. Available at: https://pact-for-skills.ec.europa.eu/community-resources/publications-and-documents/skills-and-quality-job-construction_en

86. CEDEFOP (2023). The greening of the EU construction sector: Skills intelligence data insight. Available at: https://www.cedefop.europa.eu/sv/data-insights/greening-eu-construction-sector

87. EFBWW (2023). Skills and quality jobs in construction in the era of the EGD and post-Covid recovery. Available at: https://www.efbww.eu/news/skills-and-quality-jobs-in-construction-in-the-framework-of-the/3649-a

88. Institute for Human Rights and Business, Building and Wood Workers' International (2024). Future green construction jobs: skills and decent working conditions. Available at: https://ihrb-org.files.svdcdn.com/production/assets/uploads/reports/Future_Green_Contruction_Jobs_June2024.pdf?dm=1726490051

89. Cedefop (2024). Skills forecast. Available at: https://www.cedefop.europa.eu/en/tools/skills-forecast

Steel

Across Europe, the steel sector expects job losses or stagnation in traditional production due to decarbonisation and automation. Germany (Thyssen Krupp) and the Netherlands (Tata Steel) are already restructuring, with further significant reductions anticipated as part of broader competitiveness, decarbonisation, and digitalisation efforts. Only moderate growth is foreseen in low-carbon (green) steel (e.g., Germany) and in more technical roles, which will not fully compensate for the decline in manual jobs.

Future steel jobs will increasingly require knowledge of hydrogen-based steelmaking, CCS technologies and digital process control and automation, which generally require limited reskilling for the existing workforce. However, this shift may pose risks for older workers or those with highly specialised skills tied to legacy processes, who may find adaptation more challenging.

Cement

Most countries foresee plant closures or downsizing in cement production because of decarbonisation and automation, especially in Spain and France. Manual workers are the most affected, as tasks are increasingly automated. In Denmark, employment in cement is expected to remain stable but modernised, driven by a shift towards low-carbon cement.

Future cement sector jobs will require competencies in low-carbon binders and production processes; alternative fuels and process optimisation and digital monitoring.

These transformations are creating demand for new technical skills and upskilling opportunities for workers, while also posing risks of plant closures and job losses in less modernised facilities.

Timber

By contrast, the timber industry is projected to grow significantly as a sustainable alternative to energy-intensive industries. In the UK, interviewed stake-holders indicated that through government-backed timber construction policies, requiring the expansion of planting, processing, and engineered wood production, new jobs in forestry, sawmills, and prefabrication are expected to be created. In Germany, a positive net employment effect is expected as a result of moderate job growth in prefabrication, panel manufacturing and wood-construction, minus possible job loss risks in commodity/trade segments if demand/price shocks persist. Overall, EU-level policies have emphasised the potential of timber and associated products and ways of building, something that will benefit the economies of EU Member States producing timber (notably in the Nordic countries) in the medium term.

Future timber sector roles will rely more on machine operation and digitised processing; engineered wood design and manufacturing; CNC technicians; digital fabrication specialists; sustainable forestry management, including tree planting, and bio-based materials, rather than low-skilled manual work.

Glass

Demand for flat glass for energy-efficient windows and solar panels is projected to rise. However, as production shifts to low-carbon processes, companies are expected to hire fewer manual workers and more technical operators.

Across these countries, the sector is undergoing a transition focusing on electrification, increased use of recycled cullet, high-performance glazing, and process innovation. This shift is creating demand for skilled roles in maintenance, process engineering, quality control, and other technical areas. At the same time, plants face closure risks due to import competition, high energy costs, and pressures on less competitive facilities. Engineering jobs, precision manufacturing, recycling, and digital control are expected to replace traditional furnace operation roles that may soon be automated (e.g., in France).

In most interviews with stakeholders, it was confirmed that workforce shifts between the building material industries and the construction sector are unlikely due to the different skillsets needed. However, workers from the cement and steel industry could potentially switch to work in off-site construction with little reskilling needed. Migration between the different building material industries is also unlikely.

Worker groups most affected

Along the **construction supply chain, worker groups will be affected differently**, according to the drivers of decarbonisation in their respective industry and their projected growth or decline in the coming decades. The professional groups, as set out in the table below, led by those working in the building material industries, stand out as those with the highest environmental footprints and, thus, most affected by the green transition. In the table, we also outline the specific training needs of these groups to remain relevant. For the workers to successfully acquire the skills needed, trainings need to be accessible during working hours, without wage loss or extra costs, to support work-life balance and care responsibilities. Dual or apprenticeship systems are also viable pathways to ensure that the right training is provided to new workers.

Table 5 Worker groups most affected

Workers group	Driver(s)	Training needs
Steel industry workers (furnace operators, coke/sinter plant workers, rolling mill operators, metallurgical engineers)	Transition to decarbonised steel and hydrogen-based production and use of electric arc furnaces.	Hydrogen systems and safety protocols; Electrical maintenance and automation control; Digital process monitoring and emissions tracking.
Cement industry workers (furnace operators, process controllers, maintenance technicians, quarry workers)	Decarbonisation technologies, new SCMs, alternative fuels & biomass, circularity & digitalisation, as well as emerging issues such as cyber security and plant safety.	Low-carbon material handling; Carbon capture, transport, handling and digitalisation; digital process control and automation, data safety and literacy; emissions monitoring and trading, circular economy and sustainability monitoring[90].
Glass industry workers (furnace operators, batch preparers, maintenance electricians)	Shift to electric and hydrogen furnaces for decarbonisation, advanced heat-recovery systems and hydrogen-compatible burners.	High-voltage safety and technical training; New process management and digital control systems, electrical engineering, digital process control, automation, hydrogen chemistry, advanced glass recycling processes.
Timber industry workers (sawmill operators, machinists, prefabrication and assembly technicians)	Growth in engineered wood (cross-laminated timber, glulam, prefabricated panels) and modular advanced timber construction methods.	Digital fabrication (Computer Numerical Control (CNC), BIM); Advanced design and assembly skills for prefabricated structures, advanced safety and automation skills, digital literacy, and CAD/CAM proficiency.

90. EFBWW and CEMBUREAU (2025). Cement Skills 2030 to 2050. Available at: https://www.efbww.eu/publications/reports-and-studies/cement-skills-2030-to-2050/4257-a

On-site construction workers – blue collar workers (builders, electricians, plumbers, carpenters, bricklayers, HVAC technicians, installers, etc.)	Retrofitting and renovation policies requiring climate/energy efficiency competence and adapted manual and technical trades, including energy auditors, certifiers, inspectors, and renewable technology installers.	Retrofitting and renovation skills; renewable energy infrastructure installation.
Building professionals – white collar workers (site managers, supervisors, engineers, and architects)	Engineers and architects must integrate sustainability from the design phase.	Sustainable construction practices, digital tools (e.g., BIM), and knowledge of new materials and energy-efficient design, energy auditing.
Traditional trades (stonemasonry, tile-making, pottery)	Heritage crafts may decline as focus shifts to modern technologies.	Adaptation of traditional trades (essential for cultural heritage) to modern standards; specialised renovation projects.
Workers in prefabricated-building components	Pre-fabricated/off-site construction is seen as a major opportunity in terms of efficiency gains and specialised production. Its growth will create a need for workers in more protected (factory) environments.	Digital skills (BIM, automation); industrialised assembly techniques.

3.0 Towards a just transition for construction workers

3.1 A just transition for the construction sector

3.1.1 Just transition at the EU-level

At the EU level, the just transition was institutionalised as a key component of the European Green Deal with the establishment of the Just Transition Mechanism (JTM), a **central instrument** to ensure that the shift towards a climate-neutral economy is fair and inclusive, leaving no one behind. The JTM is set to mobilise around €55 billion over the 2021–2027 programming period to support EU regions most affected by the transition, helping to mitigate its socio-economic impacts. This mechanism comprises three pillars: the Just Transition Fund (JTF), a dedicated Just Transition Scheme under the InvestEU package, and a new Public Sector Loan Facility. In particular, the **JTF**, implemented within the Cohesion Policy, supports regions and citizens in tackling the social, economic, environmental, and employment impacts of the transition. The Fund amounts to €19.3 billion, of which €10.87 billion is financed by NextGenerationEU.[91]

While the JTM is not directly aimed at the construction sector, it supports territories that are heavily dependent on industrial activities, such as steel and cement. These sectors, which provide essential inputs to construction, face major restructuring challenges as they transition to low-carbon production processes, with potential implications for employment and regional economies.

91. In current prices: https://commission.europa.eu/funding-tenders/find-funding/eu-funding-programmes/just-transition-fund_en

Box 5 EU just transition policies for building material and on-site construction sectors

- **Just Transition Mechanism** (2020) focuses on:
  - Protecting the groups most vulnerable to the transition by facilitating access to new employment opportunities and reskilling programmes.
  - Supporting carbon-intensive companies and sectors in shifting towards low-carbon technologies, stimulating innovation, and attracting public and private investment.
  - Assisting Member States and regions with high dependence on fossil fuels and industries by fostering job creation in the green economy, improving local infrastructure, and expanding clean energy and transport systems.
- **European Fair Transition Observatory**: To be launched in 2026, it will strengthen data-driven policymaking in support of just transition objectives. The Observatory will monitor and analyse the social and economic impacts of the transition, provide evidence to inform policies, and facilitate the exchange of best practices across regions and sectors.
- **New European Bauhaus Academy for Construction** (2022): A flagship initiative of the European Commission on skills for sustainable construction, it aims to accelerate the up and re skilling of the current and future workforce to transition to a resilient domestic building construction sector.
- **Social Climate Fund** (2025): Financed through the new Emission Trading System (ETS2), the Fund aims to support vulnerable households and small businesses most affected by rising energy and transport costs. It will finance investments and measures such as building renovations to improve insulation and energy efficiency, upgrades to heating and cooling systems, and the installation of renewable energy technologies in buildings.
- The European Parliament adopted in January 2026 a **resolution** calling for a just transition directive in the world of work to ensure the creation of jobs and revitalising local economies.

In addition to the EU-level policies outlined above, there is a **comprehensive ecosystem of initiatives supporting the transition of the construction sector and its workforce**. These initiatives address both associated supply chains and construction activities, promoting sustainability, digitalisation, and skills development across the sector.

Box 6 EU-initiatives supporting the just transition of building material and on-site construction sectors

- **European Construction Observatory** (since 2023): it conducts comparative analyses of the construction ecosystem across all 27 EU Member States, providing policymakers and stakeholders with up-to-date insights on market trends, economic performance, and policy developments affecting the sector. Before this, the **European Construction Sector Observatory** played a similar role since 2015.
- **High Level Construction Forum** (2020-ongoing): it brings together over 1,100 members, including companies, industry associations, national authorities, academia, and other stakeholders. The Forum serves as a collaborative platform to co-create and monitor the green, digital, and resilient **transition pathways of the EU construction industry ecosystem**.
- **Construction Blueprint 2** (2025-ongoing): a continuation of the first Construction Blueprint project, this Erasmus+ initiative aims to develop innovative training strategies and adapt education and training programmes to evolving labour market needs. It focuses on the use of digital tools, the promotion of skills related to energy efficiency and sustainability, and strengthened collaboration between businesses and education and training providers.

- **Pact for Skills** (2020): building on the Blueprint model, it fosters cross-sector partnerships to address skills gaps in the workforce. Participating partners apply for grants independently to implement targeted skills initiatives.
- **Centres of Vocational Excellence**: Five centres focus on the construction sector, providing high-quality vocational training. EU-supported projects develop training content at the EU-level, which can subsequently be adapted and scaled nationally.
- **European Alliance for Apprenticeships** (2020–ongoing): promotes the creation and enhancement of apprenticeship opportunities, including within the construction sector, through pledges and targeted initiatives.
- **Build Up Skills (2011–ongoing)**: supports upskilling and continuous professional development in construction, implemented by an agency under DG ENER, with a focus on energy efficiency and sustainable building practices.

3.1.2 Just transitions at the country-level

At the country level, several **national and regional policies** play a key role in supporting just transitions for workers in on-site construction and building material industries. All EU regions benefiting from the JTF have developed Territorial Just Transition Plans and corresponding operational programmes, which outline in detail how the Fund will be distributed locally. Regions with a strong dependence on carbon-intensive industries are prioritising measures to support workers and facilitate industrial transformation. Examples include regions heavily reliant on the steel sector, such as Taranto (Italy) and Bouches-du-Rhône (France), as well as regions linked to the cement sector, including Northern Jutland (Denmark). These regions focus on strategies to safeguard employment, promote reskilling, and economic diversification. In addition to these, key policies to support the transition of the built environment sector are emerging across countries.

Box 7 Key country-level just transition policies

France **does not have specific just transition policies for the construction sector**. However, the concept is emerging, and the ADEME public agency recently published an opinion on the topic. Since the Yellow Vests protests (2018-2020), workers are increasingly aware of the social consequences of decarbonisation policies. Debates mostly evolve around job losses and creation, the need for reskilling, and the inclusion of worker consideration.

The legislative framework provides financial support to **decarbonising cement plants**, which can include the upskilling and reskilling of workers. The national programmes "Territoires d'Industries" and the EU JTF are supporting the decarbonisation and economic diversification of territories where cement plants are located.

The **Federal Climate Protection Act** (2019, amended 2023) not only establishes legally binding emission reduction targets for all sectors, including buildings, but also underpins the integration of climate goals with social and labour considerations. In addition, the government-led **'Work 4.0 Dialogue' platform** engages unions (IG BAU, DGB) and employers (ZDB) to shape the future of work under digitalisation and decarbonisation, focusing on fair transitions and social security.

Just transition measures in the steel sector mostly focus on company policies, rather than government frameworks. Within the timber industry, the federal "**Timber construction initiative**" (Holzbauinitiative, 2023) aims at increased use of wood in the construction sector, including support for education and skilled workers.

The **Employment Rights Bill** (introduced in October 2024) strengthens job security and working conditions by granting day-one rights for unfair dismissal, banning most "fire and rehire" practices, and requiring guaranteed hours contracts after 12 weeks - changes that will significantly affect workforce planning, contract management, and compliance procedures in the construction sector. Through its updated **Industrial Strategy and Clean Energy Industries sector plan**, the government has committed £625 million to training programs that prepare workers for energy-efficient building practices and emerging green technologies. Complementary initiatives like the **Warm Homes Plan** and the forthcoming emissions reduction strategy reinforce this focus, ensuring the construction workforce is ready for low-carbon projects and future-proof employment opportunities.

Within the building material industries (cement and timber), there are **no specific just transition actions found in policy**.

Spain is considered an EU frontrunner for integrating just-transition principles in policy, e.g., through the **Sectoral RED Mechanism** (2021) that supports transitions from declining to expanding sub-sectors, helping workers shift into green roles through retraining and employment support, the Labour Reform (2021) that enhances job security by limiting subcontracting chains and promoting retraining, and the **National Integrated Energy and Climate Plan** (2021–2030) that includes provisions for professional training and energy poverty mitigation, indirectly supporting a just transition.

For the cement sector (and other industries), Spain's Institute for a Just Transition funds restructuring, retraining and diversification projects in affected 15 territories marked as 'just transition zones'. These receive special support for training/business-support schemes. There are no specific policies targeting other building material industries (i.e. flat glass).

In Poland, the just transition policy framework is focused exclusively on the coal and coal-based energy sector. The term **'just transition' is therefore not used in domestic discourse within the construction sector or related building material sectors**. As this is used in the construction sector at the European level and there are actual support instruments for trade unions, it is operational only in the sense that it provides a stream of support for trade unions operating in Poland.

Since 2024, the Just Coal Transition Commission has acted as an advisory body to the Irish Government. The group of 10 members is chaired by a representative of Ireland's second-largest trade union and advises the government on delivering Ireland's climate ambitions while ensuring no one is left behind.

In Italy, there are **no specific policies** targeting the just transition of workers in the construction sector. Discussions are emerging in some regions (e.g., Emilia Romagna) and within trade unions (e.g., "Five actions for a just transition" manifesto developed by Fillea-Cgil) but focus primarily on green buildings, affordable housing, and energy efficiency, without much attention given to aspects of workers' rights and skills.

Within the steel sector, however, which plays an important role in the region of Taranto, the **JTF** and **programme implementing** the fund are comprehensively addressing the social and economic impacts of the Acciaierie d'Italia steel plant on the territory. Measures include reskilling and upskilling programmes for workers at risk or affected by the transition, training for economic diversification, enhanced employment support services, and entrepreneurial development, including business creation and productive investments.

Social and gender specific strategies

As noted in section 1.2 under 'Workforce characteristics', women and youth are still comparatively underrepresented groups in the construction sector and relevant building material industries. Migrant workers make up a significant share of the workforce, particularly in the on-site construction sector but they face several specific barriers, including discrimination and vulnerability in the workplace[92] and violations of their right to organise and engage in collective bargaining[93]. For this reason, countries have **launched specific recruitment policies among women, youth and migrant workers**, to broaden the talent pool and promote a career in construction and address both diversity and skill gaps. The table below showcases some of the strategies and initiatives identified across the European countries that aim to improve representation and conditions for groups such as women, youth and migrant workers.

Table 6 Social and gender-specific strategies or initiatives

	Women-specific policies	Youth-specific policies	Migrant workers-specific policies
Germany	Sector-wide strategies are still lacking, while civil society initiatives promote gender inclusion.	Strong apprenticeship system supports youth entry into the sector. Legal framework allows youth participation in works council elections from the age of 16.	None identified
France	Communications campaigns from the government, companies and training centres try to attract more women and young people into the workforce. Programmes like the "Women at the heart of the construction sector" promote gender parity in the construction sector.	Other programmes such as "Build the Future!" target specifically young people.	Social-insertion programs target vulnerable groups by requiring contractors in public procurement to hire disadvantaged individuals from vulnerable groups, such as long-term unemployed, youth without qualifications, and asylumseekers.

92. ILO (2016). Migrant work and employment in the construction sector. Available at: https://www.ilo.org/media/428776/download

93. ILO (2023). Migrant workers' rights to freedom of association and collective bargaining. Available at: https://www.ilo.org/publications/migrant-workers%E2%80%99-rights-freedom-association-and-collective-bargaining

	Women-specific policies	Youth-specific policies	Migrant workers-specific policies
Spain	Initiatives like "Women Can Build" and "FemCon" promote female inclusion in technical and managerial roles.	The "Pact4Youth" aims to attract young people through dual training, career guidance, and sector image improvement.	"Welcome Work" and "Tent España" support migrant workers entry into construction through vocational training, language support, and skills recognition.
	The "TándEM" project offers training and employment opportunities in building retrofitting and renewable energy installation to 61 vulnerable individuals in the city of Madrid, including migrant workers, unemployed young people, and women, with an additional 29 participants based in Zaragoza.		
Poland	Initiatives such as "Women in Construction – Levelling the Playing Field" and "Equality Built In" aim to promote women's participation and equal opportunities in construction and counter stereotypes and highlight women's contribution to modern construction.	The BUILD UP Skills II national strategy further recommends nationwide campaigns to attract young people (and women) to energy-efficient construction occupations.	None identified
Italy	None identified	None identified	None identified
Netherlands	"Girls' Day", inclusive workplace campaigns, and childcare support to retain women in construction.	None identified	Attack Plan Technique (Aanvalsplan Techniek) tries to integrate refugees into energy transition jobs
Czechia	The DoubleDecker project report contains explicit measures to attract women, target structurally weaker regions and create campaigns for youth.		None identified
Denmark	There are targeted policies and educational campaigns intended to gradually improve the female ratio in construction. For example, the "Boss Ladies" project aims to motivate more young women to enter and develop their talent within the building and construction industry.	There are industry-wide attempts to recruit and incentive young people to enter the industry, but these attempts have largely been unsuccessful, since construction is seen as not unattractive career. Some exceptions exist such as the "EuroSkills 2025" in Denmark which features a construction initiative – the "Fehmarnbelt project".	The Danish government has increasingly turned to international talent and targets recruiting migrant workers, through Priority Lists covering occupations where there are particular skills shortages.
Ireland	Several programmes and policies are currently being implemented to improve and increase the attractiveness of the sector, especially towards students and women. The Department of Further and Higher Education, Research, Innovation and Science implemented a "Working Group for the Promotion of Careers in the Construction Sector" in 2023. The Working Group put together an action plan to increase the attractiveness of careers in the construction industry.		None identified

UK	Legal requirement for employers with over 250 employees requires businesses to report their gender (pay) gap data. In addition, the BWI Women's Committee has led initiatives to challenge the industry's entrenched macho culture, while also developing mentoring schemes and support networks for female workers.	None identified	None identified

Source: Aggregated data from country fiches (Annex I)

3.2 Labour implications of decarbonisation

Beyond the macro-level impacts on employment, workforce composition and skills (presented in section 2.3), the decarbonisation of the construction sector will have major implications for day-to-day work on construction sites and its building material sectors. Although the specific challenges vary between countries, the most **prevalent labour rights challenges** in on-site construction today are:

- **Skills shortages**: Competition for workers in the construction industry is widespread. The shortage of skills is being exacerbated by demand for green and digital skills resulting from the renovation wave and the demand for new housing. Demographic trends, primarily an ageing construction workforce, together with the historically low participation of women in the sector, bad job quality and low wages, all serve to further exacerbate the shortage[94].
- **High workload and limited time for training**: Long hours and project pressures leave little room for upskilling, hindering workers from undergoing the training needed to keep up with the green (and digital) transition. Training centres are often located far away from workplaces or homes, and low-skilled workers are seen as relatively resistant to training. Sole traders and micro-enterprises working mostly in small residential and renovation projects have limited ability or skills to manage their agendas. This is because these projects run consistently late and contractual terms are loose or non-existent. The workers/owners of micro-enterprises do not necessarily have managerial or project planning training, and they are often eager to win as many contracts as possible to compensate for payment insecurity, which increases time pressure and reduces time for training.
- **Poor working conditions undermining OSH**: Safety on construction sites is complex due to multiple companies and self-employed workers operating simultaneously, requiring coordination and clear communication. In addition, norms around masculinity[9596] can further undermine safety. In some cases, employers fail to provide sufficient training on workplace safety and personal protective equipment, even if this is required by law. In several of the countries studied, it is implied that work accidents are rarely reported. Workers' exposure to asbestos and other harmful substances is an issue in the context of energy renovations. Compliance remains weak, with 40% of workers operating under unsafe circumstances. It is estimated that OSH training needs to increase by 60% to meet EU standards.[97]
- **Fragmentation through subcontracting**: Heavy reliance on subcontracting chains and temporary work agencies obscures employer accountability, complicates enforcement, delays payments, and reduces investment in workforce development (especially among SMEs).

94. ETUI (2024). Labour shortages, job quality and workers' bargaining power. Available at: https://www.etui.org/publications/labour-shortages-job-quality-and-workers-bargaining-power

95. ILO (2025). The role and impact of masculinity on the safety and health of construction workers in Madagascar.

96. Stergiou-Kita M, Mansfield E, Bezo R, Colantonio A, Garritano E, Lafrance M, Lewko J, Mantis S, Moody J, Power N, Theberge N, Westwood E, Travers K. Danger zone: Men, masculinity and occupational health and safety in high risk occupations. Saf Sci. 2015 Dec 1;80:213-220. doi: 10.1016/j.ssci.2015.07.029.

97. European Construction Sector Observatory (2020). Analytical report on Improving the human capital basis. Available at: https://single-market-economy.ec.europa.eu/system/files/2021-02/ecso_ar_human_capital_2020_0.pdf

- **High share of self-employed/sole-traders**: Although there is no up-to-date Eurostat data and analysis of the share and nature of self-employed in the EU, a 2017 analysis notes that construction is the sector with the most 'dependent self-employed persons', meaning the worker is reliant on one client who has control over their hours of working. This means that there are many workers in construction who have to comply with clients' requests as if they were their employers, yet without the benefits and protections they would receive if they were employed instead of contracted.[98]
- **Lack of attractiveness**: The construction sector is still an unattractive sector due to low, unstable and undeclared wages, along with being physically demanding and dangerous in terms of health and safety. Despite communication/PR efforts, it is shown by the low numbers of new entrants that young people are not attracted to the construction sector, contributing to labour shortages and heavy reliance on migrant workers.
- **Recognition of qualifications across EU Member States**: Qualifications are not always recognised across borders. Although the EU has a single market for construction workers, there is no homogenous TVET system or recognition of training certification, which makes cross-border mobility for roles requiring certification challenging.
- **Shadow employment and posting of workers**: The high demand for workers in the construction industry fuels shadow employment of undeclared, often migrant workers who perform precarious, underpaid and illegal work without paying social security contributions.[99] Authorities struggle to control conditions in small residential renovation projects to projects of large scale (with complex subcontracting chains). Moreover, letterbox companies commonly send workers that are falsely declared as self-employed who work overtime and suffer from underpayment and other violations of legislation.[100]
- **New roles without adequate labour-related protections**: There is limited research on the quality of green employment. In the UK, the proportion of temporary contracts is higher in brown employment, but green workers are more often self-employed. In Portugal, green jobs have a lower level of structured provision and coverage of OSH services, a higher incidence and severity of accidents, and lower levels of professional qualification. In addition to these prevailing challenges, the green (and digital) transition is set to both exacerbate and potentially curb some of the labour rights issues of workers in the core construction sector. In the table below, we highlight the most common advantages and disadvantages expected for workers in the construction industry recognised across the ten focus countries.

98. Eurostat (2018). Self-employment statistics. Available at: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Self-employment_statistics#17.25_of_the_economically_dependent_self-employed_in_the_construction_sector

99. ELA (2023). Construction sector: Issues in information provision, enforcement of labour mobility law, social security coordination regulations, and cooperation between Member States. Available at: https://www.ela.europa.eu/sites/default/files/2023-09/ELA_construction-sector-report-2023.pdf

100. ELA (2023). Construction sector: Issues in information provision, enforcement of labour mobility law, social security coordination regulations, and cooperation between Member States. Available at: https://www.ela.europa.eu/sites/default/files/2023-09/ELA_construction-sector-report-2023.pdf

Box 8 Effects on workers and labour rights

Potential risks for workers and (exacerbated) labour rights challenges	Potential opportunities for workers and labour rights
Skills gaps for low-skilled workers Labour rights challenges in the green transition include persistent skills gaps, especially for low-skilled workers. Adaptation and upskilling are essential but difficult for these rather training-resistant workers, mostly self-employed or employed by SMEs that struggle to keep up with the green and digital transition and lack the knowledge and resources to provide training to their workers. Displacement risks loom for low-skilled workers without proper retraining or relocation support. Despite public training funds, participation and motivation remain low, reinforcing structural inequalities and limiting workforce readiness for sustainable construction.	**Lifelong learning** Increased investment in upskilling programmes (through public subsidies, sectoral funds, and employer initiatives) can ensure that construction workers can adapt to new technologies, sustainable practices, and evolving industry standards. A focus on continuous learning not only enhances employability but also fosters career progression and resilience, enabling workers to navigate future structural changes and secure future-proof roles. By embedding lifelong learning into transition strategies, the sector can strengthen inclusion and equips workers with the skills needed for green and digital construction jobs.
Salary freezes/decreases, resulting in migration Research shows that in some cases reskilling leads to lower wages than new entry jobs, meaning that internally reskilled workers earn less than new entrants who have already been trained elsewhere[101]. While new skills and competencies are essential for adaptation to sustainable construction, they often do not translate into higher wages, creating a disconnect between training efforts and financial rewards. Renovation and retrofit work may also pay less than new construction. For this reason, skilled workers often migrate to countries offering significantly better pay for similar roles, even after adjusting for living costs, which intensifies labour shortages at home. Semi-skilled workers, such as assemblers and installers, face heightened risks of job loss or reduced earnings if they cannot meet new technical requirements. SMEs and subcontracted workers, already under pressure from digitalisation and green standards, struggle to maintain competitiveness and wage levels.	**Salary increases and competitiveness** On the other hand, certified roles in sustainable construction (such as energy auditors, insulation specialists, and solar installers) are, in some countries, associated with higher wages and enhanced safety standards. In Germany, apprenticeship wages rose by 6.3% in 2024, and collective agreements introduced allowances for heat-related work, reinforcing protections. In France, transition jobs requiring advanced technical skills command higher pay and status, while publicly funded and sector-supported training programs boost employability and mobility.

101. Institute for Human Rights and Business (2024). Future Green Construction Jobs: Skills and Decent Working Conditions. Available at: https://www.ihrb.org/resources/future-green-construction-jobs-skills-and-decent-working-conditions

Incompatible OSH standards While industrialisation and prefabrication can improve working conditions, OSH training will need to be scaled up to address new technologies and processes in decarbonised construction. Retrofitting of old buildings is known to expose workers to dust, lead, asbestos, and work at heights. The lack of adequate ventilation in the case of indoor retrofitting work (e.g., insulation) is another key issue, in particular as this type of work is carried out by SMEs and micro-firms with the weakest OSH systems and least capacity to manage new risks. New construction materials (e.g., phase changing materials, active surfaces, heat storage chemicals and new insulation) could result in construction workers, installers and refurbishers being exposed to new harmful substances[102]. Without regulation, training and enforcement, the transition is likely to lead to a rise in occupational illnesses and preventable accidents. Outdoor workers face heightened climate-related risks such as extreme heat, yet enforcement of safety measures remains limited, leaving many workers exposed to unsafe working environments.	**Improved OSH standards** The green transition could improve OSH standards if stricter regulations on hazardous substances are introduced (asbestos removal only under controlled conditions) and safer materials are mandated that reduce workers' exposure to toxic chemicals. Industrialisation and prefabrication shift work off-site into controlled environments, enhancing ergonomics and reducing exposure to harsh weather and dangerous conditions. Automation, prefabrication and machine handling on-site could improve OSH, as physically demanding manual construction work would be reduced. Risks could, however, be transferred from the construction site to the factory by way of new processes or new materials. Digitalisation and robotics could reduce physically demanding tasks, lowering accident rates.
Risk of exacerbated precariousness Work shifts associated with the many transitions the construction is currently going through could further fragment supply chains dominated by SMEs. The survival of small companies often means reduced access to training, weaker unionisation, and limited social protection. Skills mismatches (see above) leave many workers struggling to adapt, leading to under-employment or contract renewal difficulties. SMEs under regulatory pressure may resort to casual labour or subcontracting, amplifying job insecurity. Freelancers and self-employed workers outside collective agreements face heightened vulnerability, while low participation in public training programmes and uneven safety standards compound risks.	**Demand for services remains high due to building stock renovation and modernisation efforts** In France, Spain, and Poland, on-site renovation jobs such as insulation installation, façade upgrades, and window replacement often become precarious because they rely on informal, multi-tier subcontracting where workers face wage theft, poor housing, and unsafe conditions. These countries are also key EU renovation hotspots, meaning demand for retrofit roles is rising rapidly, which can intensify vulnerabilities when labour oversight is weak. Precariousness can be reduced by enforcing due diligence and ethical-recruitment rules for subcontractors, expanding collective bargaining to cover renovation crews, requiring worker-protection conditions in publicly funded renovation projects and strengthen enforcement tools such as inspections and construction ID cards.

102. European Agency for Safety and Health at Work (2013). Green jobs and occupational safety and health: Foresight on new and emerging risks associated with new technologies by 2020. Available at: https://osha.europa.eu/en/publications/green-jobs-and-occupational-safety-and-health-foresight-new-and-emerging-risks

Further disadvantaged groups Already vulnerable groups, particularly migrant workers, older workers, and those with disabilities, often lack inclusive and tailored programmes, leaving them at risk of exclusion. Women and young people face additional barriers due to their already limited labour market participation and, therefore, voice, in the construction industry, while migrant workers remain exposed discrimination, wage theft and vulnerability in the workplace[103] and violations of their right to collective bargaining[104], exacerbated through language barriers and lack of social networks. New green jobs increasingly require certifications, creating a two-tier workforce: a well-paid core of certified clean-tech trades versus a precarious fringe of undeclared workers in shrinking traditional roles and renovation, insulation and small-contractor segments where the share of migrant workers is the highest and job quality is weakest. Without targeted measures, these gaps could widen, undermining fairness and social cohesion during the transition.	**Respect of workers' rights leading to change in image and increased attractiveness** Digitalisation, automation and decarbonisation could, if conditions improve, make the construction sector more attractive to young people and women by showcasing its role in climate action and technological progress. Safer, less physically demanding jobs (such as energy auditors or modular construction roles) also enable older workers to remain active longer if they upskill, while industrialised methods of construction reduce physical strain and improve safety. These changes, combined with better protections of workers' rights, and inclusion of migrant workers, could provide better working conditions for all. Investment into low-carbon learning pathways can further help reposition construction as a sector with diverse, future-proof careers, fostering inclusion and long-term workforce stability.

Source: Aggregated data from country fiches (Annex I)

Construction companies and companies supplying building materials are **completely different in their composition**. As steel, cement, timber, and glass companies are usually large, often employing thousands of people (see section 1.2), labour conditions and challenges observed in the transition are very different. The labour conditions in material sectors are shaped by powerful employers that even concentrate a country's whole market in certain cases, and labour conditions and opportunities may rely on collective agreements and worker representation bodies, such as works councils or trade union delegations. Below, we present the specific labour challenges and labour rights opportunities within the four sectors.

103. ILO (2016). Migrant work and employment in the construction sector. Available at: https://www.ilo.org/media/428776/download

104. ILO (2023). Migrant workers' rights to freedom of association and collective bargaining. Available at: https://www.ilo.org/publications/migrant-workers%E2%80%99-rights-freedom-association-and-collective-bargaining

Steel 	While increased recycling of steel material may reduce the need for coke and coal handling, decarbonised steel may still pose risks in terms of OSH. Though improved local air quality may have long-term benefits for workers' health, there are unknown risks related to CCSU technologies including high exposure to CO2, chemicals, noise and dust that may worsen labour conditions. The metal sectors in countries such as Germany, Italy and the Netherlands have strong, well-organised unions that actively advocate for fair wages, good working conditions and robust retraining frame-works. Additionally, steelworkers often have a strong occupational identity linked to the history and legacy of the sector, which can be both an asset (engagement, loyalty) and a barrier (reluctance to shift to new roles) in transition processes.
Cement 	The transition can create safer and potentially better-paid jobs in the cement sector, with less exposure to extreme heat and heavy manual labour. However, some of the growing roles may involve handling novel chemical materials, which could be hazardous and must be managed with appropriate safety measures. As with steel, the yet to be explored risks related to CCSU technologies applied to the cement sector (exposure to CO2, chemicals, noise and dust that may worsen labour conditions) may challenge workers safety. Furthermore, because the cement industry is dominated by a few multinational corporations, their focus on global competitiveness and profitability may drive cost-cutting measures, which could result in workforce reductions, job insecurity, lower wages, and compromised welfare and OSH[105]. As with steel, the restructuring of legacy employment affects the social fabric and long-established industrial identities of local communities. Strong union representation within the sector continues to play a key role in advocating for fair labour conditions, retraining arrangements and socially responsible transition pathways.
Timber 	The transition to more advanced timber construction methods is moving labour demand away from low-skilled manual tasks and towards more technical roles. This evolution requires workers to acquire new technical and digital capabilities that usually point to safer working environments and improved OSH. As production becomes more industrialised, workers must be trained to operate sophisticated machinery and quality-control systems.
Glass 	The electrification of furnaces and the adoption of modern production methods may significantly improve working environments, reducing exposure to extreme heat and airborne pollutants. Overall, the sector may see a shift from manual labour to more technical and potentially better-paid positions, potentially making the sector safer, cleaner and more attractive to new entrants. Key for glass workers is the potential opportunity for increasing work in solar PV production, for which industrial and process skills overlap and are directly transferable. This creates mobility options for workers at risk of displacement and can support a smoother transition for regions dependent on legacy glass plants.

3.3 Workers' participation and protection mechanisms

The decarbonisation of the construction sector has been ongoing for many years, with key legislation, such as the first EPBD adopted in 2002 and the first National Building Renovation Plans (or Long-term Renovation Strategies) in place since 2014. Anticipating the immense impact of these and other emerging decarbonisation policies, **governments have put in place some worker participation and protection mechanisms for workers affected by the green transition** (see specific groups in section 2.3.2). In addition to the protection resulting from collective bargaining, there are also overarching protections for workers at the EU-level that stem from EU employment legislation (EU Directives) and EU-level regulations that protect workers' rights in relation to social security, including across borders. These provide a floor for workers' rights that can be enhanced at national or sectoral level, depending on the sector.

Below, we highlight some key EU-wide mechanisms through which labour rights and conditions are being maintained and/or reinforced.

105. BWI (2025). Concrete Solutions – Advancing a just transition in the supply chains of building materials including cement. Available at: https://www.bwint.org/BwiNews/NewsDetails?newsId=150

Collective bargaining integrating just transition principles

Collective bargaining and the conclusion of collective agreements are underpinned by the fundamental right of Freedom of Association (FoA), under which individuals have the right to join a collective organisation such as a trade union and trade unions have the right to take collective action to pursue the interests of its members. This is a key provision in the context of Just Transition. As outlined in section 2.3, collective bargaining agreements are central to protecting workers' rights in the on-site construction and building material industries, in addition to universal cross-sectoral labour rights and social security provisions applied to all workers in Europe. Organisations such as IndustriAll advocate for sector-level agreements and are pushing for stronger rights and effective collective bargaining to strengthen workers' voice in the context of the many transitions and crises that the sector currently faces, through its Just Transition Manifesto. It states that effective collective bargaining agreements should include aspects of a just transition and should emphasise the right and access to training for workers in the construction value chain, to adapt to the decarbonisation of industries. Examples of collective bargaining agreements that include specific provisions for skills development necessary to work in the future green economy exist in Czechia at the sectoral level (where the current collective agreement for the construction sector obliges employers to ensure the professional development of employees) and in the Netherlands at the company level for construction and at the sectoral level in the metalworking and electrical engineering industry. An Italian collective agreement recently passed for workers in the energy sector also highlights the need for a 'balanced transition' that ensures workers' rights and their active participation in company decision-making.[106] It should be noted that company-level initiatives on just transition strategies are not always developed with the involvement of trade unions. The growth of site-level strategic planning presents an opportunity for greater worker involvement in the preparation and management of just transition.

Work Councils and worker representation

Works councils and worker representatives are critical mechanisms for ensuring transparency and worker agency in company decision-making, although their existence varies between countries. They provide access to company information and influence workforce planning, particularly when new rules are introduced and legislative frameworks evolve, as for decarbonisation. Notable examples include Tata Steel in the Netherlands and the UK, where unions have negotiated training and transition provisions.

At the European level, European Works Councils, in some instances coordinated by EU-level trade union confederations such as IndustriAll, play a strategic role in promoting just transition principles and anticipating change across multinational operations. Key enablers include strong social partner engagement at all levels (especially company-level staff representatives) who ensure that workers' voices are integrated into planning processes. These structures reinforce accountability and inclusion, making them essential for managing industrial transformation in a socially responsible way.

106. IndustriAll (2025). In Italy, new collective agreement ensures a participatory approach for a Just Transition. Available at: https://news.industriall-eu-rope.eu/documents/upload/2025/6/638851622470831370_Collective_Agreement_ensure_a_participatory_approach_for_a_Just_Transition-LT-JDELGADO.pdf

Protecting workers from extreme weather events

The proliferation of extreme weather events resulting from the climate crisis results in many challenges for construction and the built environment. Across the globe, BWI has collected 70 examples of provisions for work in extreme heat, including regulatory frameworks for work stoppages, employers' duties to ensure worker safety in extreme heat, and workers' compensation measures for work interruptions during extreme heat. The report indicates that most European countries (incl. France, Germany, Italy, Netherlands, Spain and UK) have national or sub-national legislation, ministerial instructions or recommendations/guidelines in place that require employers to take specific action when the workplace temperatures become too high. In addition, France, Germany, Italy and Spain offer payment of wages for lay-offs due to heat stress, and France and Spain offer work stoppages through collective bargaining agreements[107]. Our research confirms this through specific examples from Germany (recently agreed Collective Agreement on Weather / Climate-related Working Conditions, Spain (Royal Decree-Law that grants paid leave for workers amid environmental catastrophes), Denmark (standards on (cold) temperatures), France (2024 extension of "congé intempéries" from heavy storms, strong winds, and extreme cold to heat wave) and Italy' (Protocol for the Management of Climate Risks in the Workplace).

Adaptive labour conditions

At the European level, strong advocacy from social partners such as the EFBWW, FIEC and EBC underpin efforts to promote and strengthen skills development during adaptation to decarbonisation and digitalisation. These social partners have set up the Pact for Skills in Construction pushing for collaboration between stakeholders in VET and social partners.

In the UK, though not exclusively motivated by the 'just transition, the proposed Employment Rights Bill, currently under discussion at the time of writing, introduces transformative protections: day-one rights for unfair dismissal, statutory sick pay, parental leave, guaranteed hours after 12 weeks, and a ban on "fire and rehire." These measures aim to replace the generalisation of zero-hours contracts[108] and strengthen anti-harassment safeguards, requiring significant compliance adjustments in construction. In Spain, the Sectoral RED Mechanism allows companies to temporarily reduce working hours or suspend contracts during permanent sectoral shifts, preventing mass layoffs and supporting income stability. Together, these initiatives exemplify adaptive labour arrangements - balancing flexibility with security to protect workers' rights and agency during the construction sector's transition.

Modern and regional training infrastructure

The provision of training is essential to safeguard jobs and ensure that workers are equipped for the future. Yet it needs to be delivered in an accessible way and through approaches that ensure enhanced job stability. Germany's Skills Development Opportunities Act subsidises vocational training for workers in the context of structural change, while Poland's Competent Construction Workers programme supports SMEs in adapting to environmental standards. Ireland's SOLAS Green Skills Action Programme, funded by NextGenerationEU, offers NZEB and retrofit training through dedicated Centres of Excellence. In the Netherlands, modern training approaches such as regional hubs that link vocational schools with firms have been set up to address skills gaps, while in Czechia, CraftEdu provides scalable e-learning and certification. In Italy, modular micro-credentials and innovation laboratories are emerging as flexible, work-integrated training approaches. Finally, France demonstrates how modern VET facilities and open practice spaces make construction careers appealing. These efforts, backed by European Social Partners such as FIEC and EFBWW that insist on the modernisation of training[109], can lead to changing perceptions and promote diverse and attractive career paths.

Liability and control on subcontracting

Across Europe, trade unions and regulators focus on limiting subcontracting to strengthen accountability and protect labour rights. Spain's Law 32/2006 caps subcontracting at three levels and mandates registration through the Registro de Empresas Acreditadas (REA), ensuring compliance with labour, social security, and OSH standards. This promotes transparency and prevents unsafe or illegal practices. Germany also enforces subcontracting liability, making general contractors legally responsible for wage and safety compliance throughout the chain. France combines the Contrat de Chantier - an open-ended project contract - with the employer's duty of vigilance, requiring intervention if subcontractors breach labour laws. Also in Poland, a voluntary industry pact among major construction firms and the General Directorate for National Roads and Motorways, GDDKiA, established uniform OSH standards, training obligations, and contractual sanctions for violations for both direct employees and subcontractors. These mechanisms reduce exploitation and reinforce fair working conditions.

107. BWI (2025). Adapting to the Heat – Existing Global Responses for Workers Protections in Construction, Building Materials, Wood and Forestry Industries. Available at: https://www.bwint.org/BwiNews/NewsDetails?newsId=568

108. Zero-hours contracts are also known as casual contracts. Zero-hours contracts are usually for 'piece work' or 'on call' work, for example for interpreters. This means they are on call to work when you need them; you do not have to give them work; they do not have to do work when asked.

109. EFBWW and FIEC (2025). Joint declaration of the European social partners in construction on labour and skills shortages. Available at: https://www.efbww.eu/news/joint-declaration-of-the-european-social-partners-in-constructio/4481-a

Social ID card schemes for worker protection

Social ID cards are emerging as a key compliance and protection tool in the construction sector, ensuring transparency, accountability and safer working conditions. These schemes verify employment status, training credentials, and OSH compliance, reducing risks of undeclared work and social dumping.

In France, the Carte Professionnelle BTP includes worker identity, employer details, and a QR code for verification. Spain's Tarjeta Profesional de la Construcción certifies mandatory OSH training and acts as a digital CV. The Netherlands promotes the Digitaal Skills Paspoort, integrating health, safety, and training records to support lifelong learning. Denmark will require ID cards on large projects from 2026 to combat social dumping, while Italy is developing the Carta di Identità Professionale Edile to link skills and work history to tax codes for traceability. These systems aim to protect workers during the green and digital transition.

Public procurement standards for worker protection

Binding social procurement guidelines are vital to safeguard construction workers' labour rights. Currently, many frameworks remain non-binding, leaving public authorities hesitant to award tenders that include reinforced green/circular or social aspects, perceiving them as costly or risky. This lack of clear incentives discourages companies from investing in workforce upskilling and fair labour practices, perpetuating skills gaps.[110]

France and Germany demonstrate good practice by requiring compliance with labour laws in public contracts. France further uses charters and checklists to verify declared posted workers.[111] Embedding such standards into procurement frameworks would ensure that public contracts reward firms that uphold fair wages, safe conditions, and training for green and digital skills. This aligns market incentives with social protections, creating future-proof jobs. Such procurement reforms are also recommended in Czechia through the DoubleDecker report which suggests focusing on better labour standards in public procurement.

Specific protection for migrant workers

Several countries have introduced targeted mechanisms to protect migrant workers in the construction sector and ensure fair treatment during employment.

In Germany, the Faire Mobilität ("Fair Mobility") initiative provides counselling and multilingual information to posted and migrant workers, covering essential rights such as minimum wage, collective agreements, allowances, and accommodation. It also offers support in resolving disputes, ensuring workers from other EU countries are not left vulnerable. Spain has developed programmes like Welcome Work and Tent España, which focus on facilitating migrant workers integration through vocational training, language support, and recognition of prior skills, enabling migrant workers to access stable and qualified roles in construction. Denmark complements these efforts through union-led initiatives under Danske Byggefag, which include workshops, multilingual campaigns, advocacy for fair pay, and direct counselling for vulnerable groups. Together, these mechanisms reduce exploitation risks and promote equitable working conditions in a transitioning construction industry.

Trade union support

Trade unions are central to safeguarding worker safety, employment rights, and good working conditions in the construction sector, especially in the context of climate change and industrial transformation. They negotiate employment conditions, secure jobs, and uphold wage standards through collective bargaining, national agreements, and social dialogue at all levels.

At the European level, trade unions such as EFBWW and IndustriAll, alongside employer organisations such as FIEC, actively shape debates on digitalisation, decarbonisation, and just transition, exchanging best practices and collaborating with employers and government. In countries like the UK, unions work closely with employers and government to improve working conditions, influence policy, and support training and skills development. In Germany and France, unions co-fund and manage vocational training and upskilling, while in Denmark, they ensure equal treatment for migrant workers via collective agreements. Across Europe, unions are vital in promoting inclusion, agency, and accountability, ensuring workers' voices are heard and their rights protected during sectoral change.

Limits to temporary contracts

In Spain, the 2021 Labour Reform (implemented through Royal Decree-Law 32/2021) aimed to curb high temporary employment by simplifying contract types and promoting fixed indefinite contracts. It also abolished temporary short-term contracts and introduced mandatory reassignment or retraining after project completion, improving job stability for both direct and subcontracted workers.

Limits to temporary contracts are easier to implement in factory environments, like in the cement, steel, timber and glass industries, but more challenging to implement in on-site construction as assignments often are associated with the completion of a project or a specific work.

110. Goodwin Brown, E., Kuijt S. & Raghunathan S. (2025). Just Transition to Circular Construction in Europe. Available at: https://www.circle-economy.com/resources/just-transition-to-circular-construction-in-europe-measures-for-workers

111. ELA (2023). Construction sector: Issues in information provision, enforcement of labour mobility law, social secu-rity coordination regulations, and cooperation between Member States. Available at: https://www.ela.europa.eu/sites/default/files/2023-09/ELA_construction-sector-report-2023.pdf

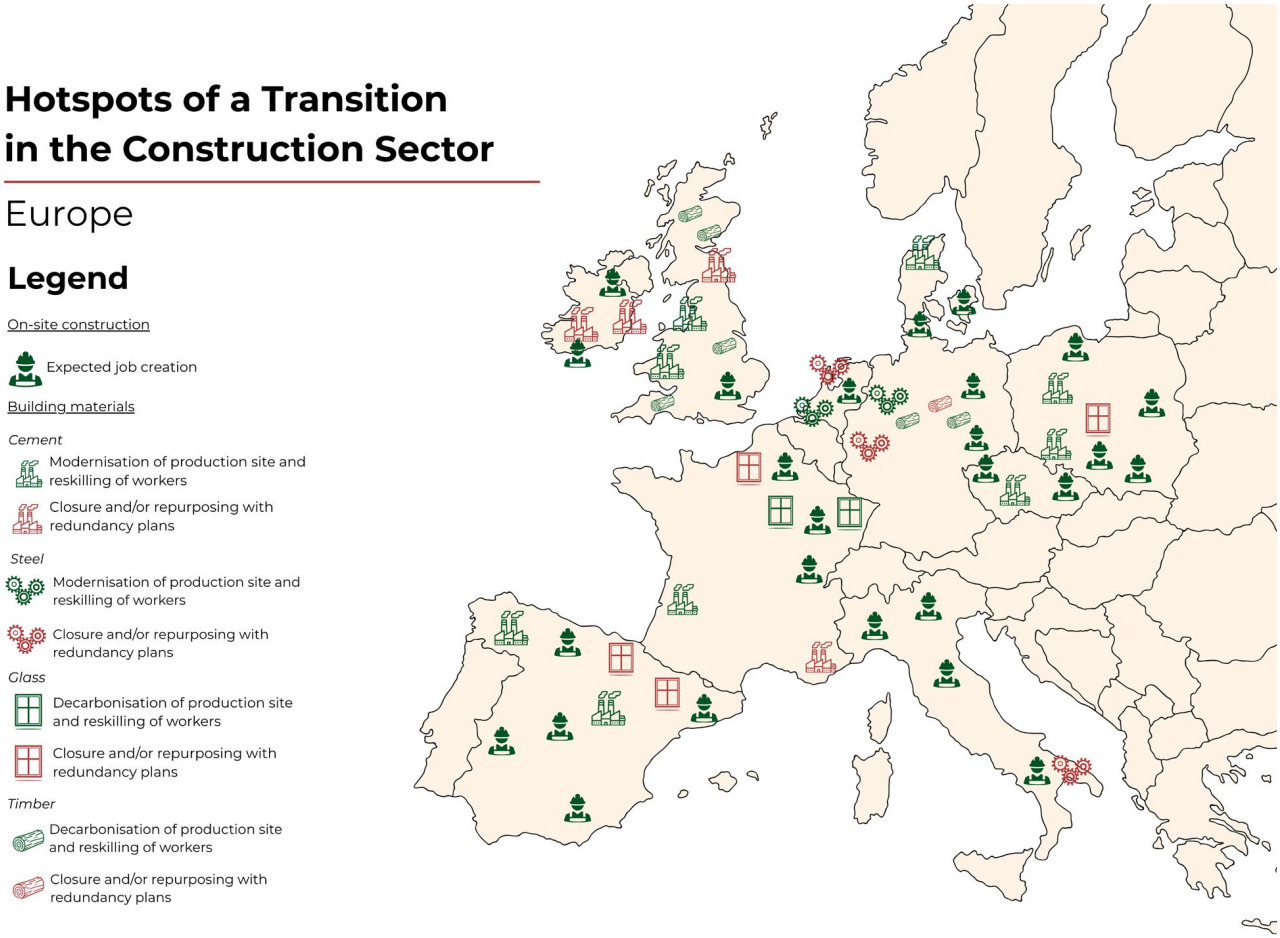
3.4 Hotspots of transition

After discussing the policies and labour implications of a decarbonised construction sector, the following map aims to highlight **key transition hotspots** across the ten countries covered in this study. The country fiches include more detailed versions of the map. The European-wide map examines job creation and loss trends for on-site construction and building materials industries. Based on data from the country fiches (Annex I), this mapping is not exhaustive and does not link job losses in one sector to gains in another; it simply identifies **major transition hotspots and how workers are involved**. Overall, construction jobs are expected to grow due to strong renovation demand, while steel, cement, glass and timber face uneven transitions shaped by geography, investment, trade union involvement, and industrial capacity.

For the **on-site construction sector**, the country research concluded that regions with high renovation needs (Germany, France, the Netherlands, and Poland) face acute skill shortages and strong potential to absorb workers from restructuring industries, while parts of southern Europe with lower renovation rates and more vulnerable facilities face greater risks of net job loss. Industrial risks cluster in rural, carbon-intensive regions, whereas job creation aligns with areas investing in low-carbon production and large-scale construction.

In **steel**, the country research identified that job losses are concentrated in northern Germany, the Benelux region and southern Italy, while modernisation-related job creation and reskilling occur in western Germany, Poland and the Benelux. In **cement**, the country research identified that redundancies appear in the UK, Italy, France and Spain, whereas modernisation projects (often linked to CCS and alternative fuels) are strongest in Germany, Poland, France and the Nordic countries. At the company level, major cement producers such as Holcim have adopted just transition strategies, while others like Heidelberg Cement and Vicat have committed to retraining or compensating workers affected by the transition. The country research also identified cases in Spain and France where trade unions were crucial in securing reskilling and other training agreements. In the **glass** industry, the country research identified that job losses occur in France, the UK and Italy, while modernisation hubs with reskilling needs emerge in Germany, Poland and Spain. In **timber**, the country research identified significant growth and decarbonisation investments in the UK, while Germany expects both pressures due to market downturns and opportunities linked with new job opportunities in the sector. In the UK, the creation of a national forest in a former industrial area and a planned new national forest will likely result in job creation in the sector.

Figure 6 Hotspots of a Transition in the Construction Sector



4.0 Conclusions

The construction sector in Europe stands at a crossroads. Evolving policy and legal frameworks aiming at decarbonisation in addition to the digital transition, automation, robotisation and the turn to off-site construction, are expected to transform the way buildings are constructed and used. Against an international backdrop of intersecting polycrises - including the climate crisis and its effects, the energy crisis, raw material shortages, and disruptions linked to geopolitical events and conflicts in and around Europe - all industries connected to construction and the built environment are affected. In addition, demographic pressures across Europe are expected to rise, with populations ageing and immigration policies tightening. By examining labour rights challenges emerging from decarbonisation-related transitions, we confirm that labour rights in construction are currently challenged by a variety of factors.

On-site construction remains one of the most challenging industries in terms of labour rights, with workers frequently exposed to vulnerabilities in OSH and payment security, with low access to training due to multiple levels of subcontracting and precarious work contracts. The sector's resilience is undermined by persistent demographic challenges – with insufficient numbers of new entrants, an ageing workforce, and limited absorption of women, youth and – creating severe skills shortages. The current demand for workers is high, with negative projections for the renewal of the workforce. As a result, even workers who will not upskill to serve decarbonisation goals and work in the construction of high-performing buildings will remain in demand in the medium term for simpler projects, such as small-scale residential renovations. Europe's ageing building stock, combined with pressure to increase the supply of new affordable housing, will continue to ensure employment even for the less skilled.

Overall, projections suggest that the renovation wave and green transition could support **net job creation** in construction, particularly in renovation-related manual, technical and professional roles. While policy-driven scenarios estimate employment growth of up to 3.6% and more than 300,000 additional jobs by 2030, baseline forecasts point to **limited net growth** or even decline over the longer term. Regardless of net employment trends, labour demand will remain high due to demographic pressures, with millions of job openings driven by replacement needs. In the renovation sector alone, large-scale retirements will make recruitment and skills availability a decisive factor for successfully delivering the renovation wave.

At the same time, **building material industries** (steel, cement, timber and flat glass) are under pressure to decarbonise. These materials represent important shares of global emissions, and the bulk of them are used in construction. While materials such as cement and steel are under scrutiny, the anticipated job losses have not yet materialised, and the emergence of green steel and low-carbon cement offers pathways for existing workers to transition with minimal reskilling. Conversely, the timber industry may balance off some of the reductions in cement/steel production, as hybrid construction approaches using more sustainable bio-based materials and prefabrication from wood gain traction. Glass production, though less discussed, will also require innovation to meet energy efficiency and circularity goals.

Considering these pressures, there is an urgent need for the whole construction supply chain to transition rapidly, and in a **just manner** that ensures that workers most affected not only retain their jobs but see improvements in terms of labour conditions. Some **mechanisms that protect workers** from the adverse effects of the green transition have already been put in place, for example, by embedding just transition principles into collective bargaining. Other promising measures in Europe protect workers during extreme weather events (i.e. heat waves) and ensure compliance with labour rights via social ID cards. However, these are still isolated measures, and none of the examined countries displayed a comprehensive protective framework for construction workers.

Beyond the individually identified protection mechanisms, considerable **gaps in terms of labour rights** remain. To maintain and reinforce fair labour conditions along the construction supply chain in the years to come, the most urgent gap is related to the area of **skills development**. Skills linked to energy efficiency, digitalisation and circular economy are in high demand, along with transversal skills in regulatory compliance and project coordination. Overall, a shift is expected from low-skilled workers to skilled trades and technical roles, alongside managerial profiles with integrated technical and soft skills. Also, within the steel and cement sectors, decarbonisation is leading to the need for reskilling, switching from traditional furnace operation and maintenance to automation control, emission monitoring and handling of (green) steel and cement, bio-based materials and flat glass for energy-efficient windows and solar PV panels. Overall, automation in the production of low-carbon materials could mean that fewer manual workers will be recruited.

Although some cases of modern and regional training infrastructure exist, **barriers** such as low willingness to attend training (as not remunerated), high training costs, and unclear financing responsibilities (government vs. companies) hinder progress. To ensure a just transition, coordinated efforts and resources are needed to build capacity, invest in dedicated educational programs, and develop clear VET roadmaps that integrate technological innovation and sustainability while prioritising workers' needs. Collaboration among industry actors, unions, and policymakers will be critical to unlock these opportunities and secure decent work in the evolving construction landscape.

In addition, specific mechanisms to **integrate underrepresented groups** (women, youth) in these transitioning and evolving sectors are still lacking. Despite a number of social- and gender-specific strategies and mechanisms designed to protect migrant workers, there is still a need to increase their agency in the construction labour market. Salary increases, improved OSH standards, and more stable, safer and quality jobs could help transform the current lack of **attractiveness** of the construction sector. At the **workplace and sectoral level**, a stronger set of protective measures is required to translate just transition principles into concrete improvements in workers' daily conditions. Sectoral and workplace social dialogue mechanisms are essential to anticipate change, manage restructuring processes, and jointly define skills needs and career pathways. Rights-based access to training, combined with guaranteed wage progression and recognition of acquired skills, can help ensure that upskilling and reskilling do not become an individual burden for workers. Stronger enforcement of employment standards and fair recruitment

practices, including limits to excessive subcontracting chains, is critical to reducing precariousness and improving payment security. In parallel, stable and predictable public investment in construction and renovation, linked to robust social and environmental procurement standards, can set minimum requirements for decent work across the supply chain. Measures promoting work-life balance, predictable working time, and overall good working conditions are equally important to improve the sector's attractiveness and retain workers in a context of growing labour shortages.

Throughout the analysis, collective bargaining stands out as a cornerstone for safeguarding worker rights, though its effectiveness varies by country and sector. Trade unions play a pivotal role in safeguarding labour rights and shaping a just transition in the construction and building material industries. Their involvement ensures that workers' voices are included in decision-making processes on how to approach decarbonisation. It is clear that they, together with employers, government and other key actors along the supply chain, need to come together to **design a pathway for the decarbonisation of the construction sector that is just and does not leave behind** the workers producing the material and constructing the buildings of tomorrow.

Annex I: Country Fiches

Please see separate files for:

- Germany (covering core construction sector, steel, timber)
- France (covering core construction sector, cement, glass)
- United Kingdom (covering core construction sector, cement, timber)
- Spain (covering core construction sector, cement, glass)
- Poland (covering core construction sector, cement, glass)
- Italy (covering core construction sector, steel)
- the Netherlands (covering core construction sector, steel)
- Czechia (covering core construction sector, cement)
- Denmark (covering core construction sector, cement)
- Ireland (covering core construction sector, cement)

Annex II: List of organisations interviewed

Country covered	Organisation
Czechia	Association of Construction Entrepreneurs of the Czech Republic (SPS)
Czechia	Czech Labour Union for Construction
Denmark	Federation of Trade Unions (FH) - Copenhagen Branch
Denmark	United Federation of Workers in Denmark
EU	BWI
EU	EFBWW
EU	European Commission (DG EMPL + DG GROW)
EU	IndustriAll
EU	European Construction Industry Federation - FIEC
France	ADEME
France	FFB
France	Fondation BTP-PRÉVOYANCE PLUS
France	FFIE Pays de la Loire
France	Impulse Partner

Germany	IG Bau
Germany	Fraunhofer Informationszentrum Raum und Bau
Ireland	CIF
Italy	FILLEA CGIL
Netherlands	TNO - Circular Construction, Mobility & Built Environment Unit
Netherlands	SBS Smart Building Design
Netherlands	FNV
Poland	ZZ Budowlani
Poland	Polish Green Building Council
Poland	Forum Związków Zawodowych
Poland	Polish Union of Employers and Manufacturers for Construction Industry
Poland	NSZZ Solidarność
Spain	Fundación Laboral de la Construcción
Spain	CCOO del Habitat
Spain	Castile and Leon Regional Government
Spain	Confederación Nacional de la Construcción
Spain	UGT FICA
UK	Unite the Union
UK	TUC
UK	UK Green Building Council
UK	Institute for Human Rights in Business
UK	City Building Glasgow

Annex IV: Mapping of key partnerships and initiatives

The table below illustrates key partnerships and initiatives that are promoting a fair transition in the built environment. These include collaborations between labour organisations, climate NGOs, business organisations and foundations. It covers partnerships in the ten focus countries.

Name of partnership / initiative	Involved parties	Geographical area	Website
KnowHowHP project -Upskilling for boosting heat pump installation in refurbishments	Academia, training	Austria, Italy, Germany	https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/projects-details/43252405/101166831/LIFE2027
OURCEE: Overcoming Underperforming Renovations in CEE	EU-funded project / capacity-building	Central & Eastern Europe (incl. Poland)	https://www.pnec.org.pl/en/our-cee
Council of Economic and Social Agreement of the Czech Republic	Government (various ministries); Trade Unions (e.g., CMKOS); Employers' organisations	Czech Republic	https://www.tripartita.cz/
Transformační platforma (Transformation platform)	Public authorities, regional gov-ernments, employers and trade unions	Czechia	https://www.dotaceeu.cz/cs/evropske-fondy-v-cr/kohezni-politika-po-roce-2020/uhelne-regiony/transformacni-platforma
VELUX Group and HusCompagniet partnership	Businesses	Denmark	https://press.velux.com/the-velux-group-and-huscompagniet-in-new-partnership-on-the-living-places-concept/
Climate Partnership for Construction 2030	National government and indus-try	Denmark	https://climatepartnerships2030.com/
Bridge to the Future (Broen til Fremtiden)	Danish trade unions, green NGOs, social movements, and researchers	Denmark	https://broentilfremtiden.dk/
The BAT-Cartel	Labour organisation (incl. trade union)	Denmark	https://danskebyggefag.dk/

Reduction Roadmap	Industry	Denmark	https://reductionroadmap.dk/
VELUX Group and HusCompagniet partnership	Other (partner agreement)	Denmark	n/a
Pact for Skills (Construction Ecosystem)	Business networks, trade unions, public sector, academia, training facilities	EU27	https://pact-for-skills.ec.europa.eu
European Alliance for Apprenticeships (EAfA)	Business networks, trade unions, public sector, academia, training facilities	EU27	https://ec.europa.eu/social/main.jsp?catId=1147
Build Up Skills	Public sector, academia, training facilities, supply-chain actors	EU27	https://build-up.ec.europa.eu/en/bup-skills
Blueprint for sectoral cooperation on skills	Academia, training facilities, business networks, trade unions	EU27	https://employment-social-affairs.ec.europa.eu/policies-and-activities/skills-and-qualifications/working-together/blueprint-sectoral-cooperation-skills_en
European Construction Sector Observatory (ECSO)	Public sector, academia, business networks	EU27	https://single-market-economy.ec.europa.eu/sectors/construction/european-construction-observatory-eco_en
Just Transition Platform (JTP)	Regions, national governments, employers, trade unions, public authorities	EU27	https://ec.europa.eu/regional_policy/funding/just-transition-fund/just-transition-platform/about_en
Clean Steel Partnership	Steel producers, research organisations, European Commission	EU27	https://www.estep.eu/clean-steel-partnership
ARISE project	Academia, training	EU27	https://www.ariseproject.eu/
Construction 2050 Alliance	Business networks, trade unions, public sector, NGOs, supply-chain actors	Europe	https://www.construction2050.eu
Circular Buildings Coalition (CBC)	NGOs, business networks, academia, supply-chain actors, climate organisations	Europe	https://www.circularbuildingscoalition.org

Centres for Vocational Excellence (CoVEs)	Academia, training facilities, public sector, business networks	Europe	https://employment-social-affairs.ec.europa.eu/policies-and-activities/skills-and-qualifications/skills-jobs/centres-vocational-excellence_en
European Alliance for a Just Transition	Civil society organisations, trade unions, climate/environment NGOs	Europe	https://www.alliancejusttransition.eu/
Green Steel for Europe	Research institutes, steel industry, policymakers	Europe	https://www.estep.eu/projects/estep-projects/green-steel-for-europe
Circular Cities Declaration (CCD)	Cities, municipalities, public authorities, NGOs, academia, industry partners	Europe	https://circularcitiesdeclaration.eu/
BUS-Go Circular Project	Public authorities, training providers, academia, industry associations, SMEs	Europe	https://busgocircular.eu/
SIDECIC – Social Identity Cards in Construction	Research institutes, industry associations, trade unions, labour authorities	Europe	https://www.sidecic.eu
Greener Jobs Alliance	trades unions, student organisations, environmental groups, and individual supporters	Europe	https://greenerjobsalliance.co.uk/
CCCA-BTP	Business networks, trade unions, public sector, training facilities, CSOs.	France	https://www.ccca-btp.fr/fr
Fondation BTP-Prevoyance +	Foundation	France	https://www.fondationbtpplus.fr/home.html
La Fresque du Climat	Businesses, NGOs, citizens	France	https://fresqueduclimat.org/
Club décarbonisation	Business associations	France	https://www.ffbatiment.fr/actualites-batiment/actualite/les-decarbones

Initiative d'engagement sur la Transition Juste	Businesses and financial organisations	France	https://www.frenchsif.org/isr_esg/lancement-dune-initiative-dengagement-sur-la-transition-juste/#:~:text=Rassemblant%204300%20milliards%20d%E2%80%99euros%20d%E2%80%99actifs,dans%20quatre%20secteurs%20d%E2%80%99activit%C3%A9
Conduite d'une opération de construction à faible impact carbone	Academia, NGOs, businesses	France	https://www.cstb.fr/nos-offres/toutes-nos-offres/formation-conduite-d-une-operation-de-construction-a-faible-impact-carbone
Bauwende Allianz	NGOs	Germany	https://bauwende-allianz.org/
natureplus e.V. – sustainable building products network (incl. BUND & IG BAU)	Environmental NGOs (e.g., BUND), scientific institutes and industry	Germany / Europe-wide	https://www.natureplus.org
bauhandwerkerinnen	CSO	Germany	https://www.bauhandwerkerinnen.com/
Klischeefreie Berufs- und Studienwahl	CSO	Germany	https://www.klischee-frei.de/
Handwerkerinnenhaus Köln e.V. – Lern- und Bildungsort für Mädchen und Frauen	CSO	Germany	https://www.handwerkerinnenhaus.org/
Work 4.0 (Arbeit 4.0)	Federal Ministry of Labour and Social Affairs, DGB, IG BAU, ZDB	Germany	https://www.bmas.de/DE/Arbeit/Digitalisierung-der-Arbeitswelt/Arbeiten-vier-null/arbeiten-4-0.html
ReBau – Resource Efficient Construction	Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR), ZDB, IG BAU, universities	Germany	https://www.bbsr.bund.de/
Alliance for Circular Construction ("Allianz Kreislaufwirtschaft Bau")	UBA, industry associations, unions, universities	Germany	https://www.umweltbundesamt.de/
Klima-Allianz Deutschland – Building Transition Working Group	NGOs, IG BAU, architects' associations, municipalities	Germany	https://www.klima-allianz.de/

Erasmus+	Public sector, academia, training facilities, NGOs	Global	https://erasmus-plus.ec.europa.eu
Advancing Just Transitions in the Built Environment (research project)	Research/academia, NGOs, policy-makers, industry	Global	https://justtransitionsbuiltenvironment.ihrb.org/
Just Transition Alliance	Trade unions, NGOs, climate organisations.	Ireland	just_transition_alliance_declaration_march_2022.pdf
Just Transition Commission	Public sector, trade unions, business networks	Ireland	Just Transition Commission
Construction Sector Group	Public sector	Ireland	Construction Sector Group
RES project -Resilient System for the Recognition of Energy Skills	Academia	Italy	https://www.ibimi.it/res2/en/homepage/
SKEMA project - SKill Ecosystem, Market-driven learning and Advanced training for green and smart installers	Academia, training	Italy	https://ec.europa.eu/info/funding-ten-ders/opportunities/portal/screen/opportunities/projects-de-tails/43252405/101213970/LIFE2027?order=DESC&page-Number=1&pageSize=10&sortBy=es_SortDate&frameworkProgramme=43252405&topicAbbreviation=LIFE-2024-CET-BUILDSKILLS
Construction Professional Identity Card (Carta d'Identitá Professionale Edile – CIPE)	Training	Italy	-
RESSKILL project - Renewable Energy System Integration and Digitalization Upskilling Initiative for Sustainable Buildings	Academia, training	Italy, Spain, Ireland, Greece	https://www.resskill.eu/
Digitaal Skills Paspoort	Other (paritarian initiative)	Netherlands	volandis.nl/kijk-vooruit/digitaal-skills-paspoort
Manifest Werk en Ontwikkeling (2023)	Other (joint labour–employer initiative)	Netherlands	–
Het Nieuwe Normaal (HNN)	Public-private partnership	Netherlands	https://www.hetnieuwenormaal.nl

Eerlijke Klimaatagenda (Fair Climate Agenda)	Milieudefensie, FNV (incl. FNV Bouw/sector representation), Techniek Nederland, NVDE, Natuur & Milieu, Natuur- en Milieufederaties, Aedes (social housing), Woonbond, and others.	Netherlands (national)	https://milieudefensie.nl/actueel/lancering-eerlijke-klimaatagenda
Fala Renowacji (Renovation Wave Poland)	Campaign / association	Poland	https://www.knaufinsulation.com/news/knauf-insulation-joins-forces-partners-to-launch-a-renovation-wave-association-poland
EPC Plus – „Renowacja z gwarantowaną oszczędnością"	Financial / policy-instrument	Poland	https://fineergodom.eu/the-first-call-for-applications-for-the-priority-programme-renovation-with-guaranteed-savings-epc-energy-performance-contract-plus-has-been-launched-in-poland/
ONESTOPSHOP for energyefficient building renovation (Poland)	Technical/ advisory service initiative	Poland	https://interreg-baltic.eu/project-posts/renowave/poland-supporting-250-buildings-and-counting/
TERMO Programme (BGK)	Public financial programme	Poland	https://www.en.bgk.pl/about-us/
Pact4Youth (Construction)	Fundación Laboral de la Construcción, education providers, employers	Spain	pact4youth.fundacionlaboral.org
Tent España (Tent Partnership for Refugees – Spain Coalition)	Tent Partnership for Refugees, Spanish employers, Ministry of Inclusion, NGOs	Spain	tent.org/espana
Construye 2030+ (BUILD UP Skills Spain)	Fundación Laboral de la Construcción, Confederación Nacional de la Construcción, CCOO del Hábitat, UGT FICA, Consejo Superior de Investigaciones Científicas, FUNDAE	Spain	fundacionlaboral.org
Alianza por la Rehabilitación de Viviendas sin Dejar a Nadie Atrás	Alliance of civil-society groups incl. CCOO (CS CCOO & CCOO del Hábitat), UGT / UGT-FICA, environmental & energy NGOs (ECODES, Ecoserveis, Greenpeace, etc.), housing providers and research institutes (e.g., Instituto Eduardo Torroja de ciencias de la construcción). (ECODES - Tiempo de actuar)	Spain	https://ecodes.org/hacemos/energia-y-personas/rehabilitacion-energetica-de-viviendas/alianza-por-la-rehabilitacion-de-viviendas-sin-deja-a-nadie-atras(ECODES - Tiempo de actuar)

Alianza por el Clima (Spain)	Very broad climate platform with major environmental NGOs (Greenpeace, WWF España, Ecologistas en Acción, Amigos de la Tierra, SEO/BirdLife), unions (CCOO, UGT), rural and farmers' groups and development NGOs.	Spain	https://alianzaporelclima.org
VISIBLE – Cities for Clean Construction	C40 Cities Climate Leadership Group	Spain (Madrid), Norway (Oslo), UK (London) Poland (Warsaw)	c40.org
Welcome Work	Consortium of NGOs, training providers, labour orgs (incl. FLC)	Spain, Poland, France, Ireland, Denmark	welcomeworkproject.eu
Campaign Against Climate Change	Business organisation; Labour organisation (incl. trade unions)	UK	https://www.campaigncc.org/
Worker-led transtition	TUC & NEON	UK	https://neweconomyorganisers.org/worker-led-transition
Climate Jobs UK	Trade unions	UK	https://climatejobs.org.uk/
Futureproofing manufacturing	Labour organisation (incl. trade unions)	UK	https://www.tuc.org.uk/futureproofing-manufacturing
CO2nstructZero	Initiative	UK	https://www.constructionleadershipcouncil.co.uk/workstream/co2nstructzero/
Our Power Platform	Initiative	UK	https://platformlondon.org/resource/our-power-offshore-workers-demands-for-a-just-energy-transition/