

Evolving the well-established

# Project „Cement Skills 2030 to 2050“ **vdz**

## – Final Report by VDZ

Study commissioned by



Dusseldorf, February 2025



**Funded by  
the European Union**

## Abstract

### **Job profiles: Working in the cement industry – The skills project**

The decarbonisation of cement production will require completely new qualification requirements and job profiles in the future. These must be taken into account in the training and further education of employees in the future.

In a new study commissioned by the European Federation of Building and Construction Workers' Unions (EFBWW) and CEMBUREAU, VDZ (the Association of German Cement Manufacturers) is analysing the extent to which the use of new technologies and production processes for the green transformation (including CCUS, hydrogen, new cements) will affect employment requirements in the cement industry. The project is funded by the European Commission.

The study, will first outline the requirements of the EU Green Deal and describe the industry's CO<sub>2</sub> reduction strategies. Based on expert workshops and interviews, case studies will be developed for six EU Member States (Belgium, France, Germany, Greece, Poland, Spain) to show the status quo of qualification and training structures as well as future training needs. The study provides recommendations for action for social partners and policy makers.



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the European Union**

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# **Executive Summary – Project „Cement Skills 2030 to 2050“**

**vdz**

# Executive Summary: Objectives of the project & guiding questions

<b>External (political) context</b>	<ul style="list-style-type: none"><li>▪ The cement industry is undergoing multiple transformations - decarbonisation, digitalisation, demographic change.</li><li>▪ A wide range of policy and regulatory frameworks are impacting companies and their employees.</li><li>▪ Which parts of the regulatory and policy framework are most relevant to the cement industry?</li><li>▪ What skills requirements can be derived from this external context?</li></ul>
<b>Status quo and future skills' requirements</b>	<ul style="list-style-type: none"><li>▪ To manage these changes, the cement industry and its social partners need to identify strategies to prepare the workforce for this changing environment.</li><li>▪ What are the specific skills requirements from a technical, digital and regulatory compliance perspective?</li><li>▪ How can the existing workforce be reskilled and upskilled, while attracting new talent to the sector?</li></ul>
<b>Future training requirements</b>	<ul style="list-style-type: none"><li>▪ The use of new technologies, materials and managing the CCUS value chains, requires a new range of skills and competences.</li><li>▪ To what extent do companies' training concepts need to be adapted?</li><li>▪ What training approaches can help to successfully deliver new content and meet the needs of workers of different ages and cultural backgrounds?</li><li>▪ How can the social partners contribute these changes?</li></ul>
<b>Policy recommendations</b>	<ul style="list-style-type: none"><li>▪ From the results of the analysis, recommendations can be made on where existing training strategies, training provision and policy frameworks need to be refocused and made fit for purpose.</li><li>▪ What are the key take-aways for company management &amp; HR departments, for trade unions &amp; works councils and also for policy makers to make this transformation a success for employers, employees and society as a whole?</li></ul>



## Cement manufacturing and products are affected by almost all policy areas

- The cement industry is affected by almost all elements of the Green Deal with the EU Emissions trading scheme (EU ETS) including the Innovation Fund and the Carbon Border Adjustment (CBAM) being the key policy areas for the transformation and competitiveness of the sector in Europe.
- Zero pollution policies also have a strong impact on the success of the transition, especially with regard to the Industrial Emissions Directive as the basis for permitting procedures.
- The increasing complexity of the regulatory framework and reporting requirements is challenging cement producers across Europe, placing a heavy administrative burden on companies and requiring new skills and personnel to comply with new regulations.
- Looking at the whole value chain of cement and concrete, new requirements and skills for the use of building materials, the whole life cycle carbon footprint of buildings, the development of lead markets for low carbon and near zero building products are becoming increasingly important for the industry.

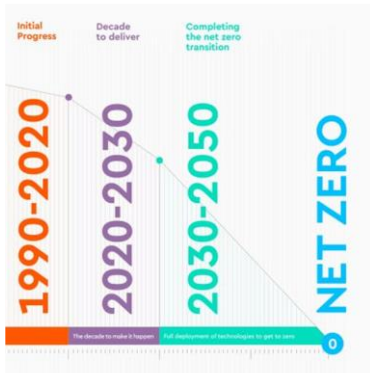




## Various strategies and action plans with fairly limited positive impact on companies

- European Skills Agenda provides overall framework for skills policy in the EU. A number of action plans and measures have been launched as a result. However, the impact "on the ground" in the cement industry is limited. Policies should be more tailored to industry-specific needs and realities to make EU support more actionable.
- There is a lack of wider understanding of how to take advantage of available support schemes or benefit from concrete actions at national level. The initiatives and actions are often complex, with varied eligibility criteria, application processes and specific sectoral requirements that can be challenging for companies to navigate.
- EU and national skills policies should in future be more responsive to the specific needs of enterprises and workers, in order to ensure transparency about what is actually being done and how enterprises' education, lifelong learning, retraining and upskilling strategies can actually benefit from the instruments at their disposal.





## From roadmaps to implementation – a net zero industry is possible

- Various roadmaps at national, EU and global level identify the key levers for decarbonisation. They are all based on the so-called 5C approach, which looks at the entire value chain from clinker, cement and concrete to construction and (re)carbonation (= uptake of CO<sub>2</sub> in concrete structures).
- Approximately two thirds of the emissions from clinker and cement production can be reduced through conventional measures such as higher energy efficiency, alternative fuels and the efficient use of clinker in cement, cement in concrete and concrete in construction.
- To achieve climate neutrality the use of carbon capture, transport, storage and utilisation (CCS) is a necessity. It involves high costs and new infrastructure across Europe.
- Therefore, the cement industry is dependent on a regulatory framework that enables the deployment of CCUS and the build-up of transport and storage infrastructure in the 2030s.
- At the same time, decarbonisation requires collaboration along the cement and concrete value chain, using the full leverage of process and product innovation.

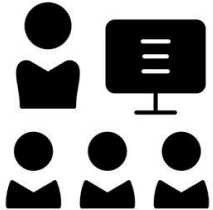




## Skills requirements, education & training today and tomorrow

- As decarbonization is the most crucial and challenging transformation process in the cement industry, the study design focuses specifically on an in-depth analysis of the professional skills requirements.
- In parallel, the development and implementation of innovative technologies in the industry will inevitably lead to an increase in new digital systems and programs, which require new skills of the work force.
- Language and interpersonal skills will also become increasingly important. However, the study's focus is exclusively on the professional and digital skills.
- A clear classification of occupations in the cement industry is essential. For the purpose of the study, the International Standard Classification of Occupations 2008 (ISCO-08) was used, which provides internationally comparable definitions.





Workshop

## Summary of key findings

- High demand for specialists in risk management, automation, environmental technologies and communication, particularly in areas like chemicals and new technologies.
- Important soft skills such as empathy, adaptability, creativity, and leadership are crucial for successful project implementation and stakeholder engagement.
- Growing importance of AI and new technologies: Training on safety and AI-driven processes is essential across all occupational groups.
- Lifelong learning becomes increasingly important: Develop tailored, hands-on training programs for different target groups to ensure skills transfer.
- Enhancing sector attractiveness through social dialogue, improved working conditions, and intergenerational collaboration.
- Addressing demographic challenges to tackle skilled labor shortages through educational cooperation and industry-specific training programs.





## Summary of key findings – Skills, education & training today

- Majority of companies with training strategy in place or in development, 20% mention no specific plan.
- Collective agreements between the social partners on employee training with different status across countries. Individual training programmes at company level are mainly determined by HR departments.
- Participation in training programmes varies for the following reasons: 1) training needs; 2) employee motivation; 3) time for training; 4) cost of training; 5) no suitable offers. The level of participation in training also appears to vary partly by occupation or age group.
- Training topics today dominated by health & safety in all countries, higher variation among other topics, i.e. environment & climate protection, soft skills, quality assurance & analytics.





## Summary of key findings – Training formats & image of the sector today

- External in-person training courses and e-learning are the most commonly used training formats. Most participants were satisfied with the training materials provided, but still room for improvement.
- Personal interaction is the most important form of internal communication about changes, new technologies and associated health & safety topics.
- The cement industry has a rather negative image as a place to work. However, this perception is dynamic, i.e. the image is changing either positively (decarbonization) or negatively.
- Shortage of skilled labour already today, especially technicians, associate professionals & machine operators - negative trend expected in coming years.





## Summary of key findings – Future skills and training requirements (Part 1)

- Carbon capture, transport, handling and digitalisation will become most relevant professional skills.
- Digital process control, data safety and literacy as most pressing digital skills.
- Emissions trading, circular economy and sustainability monitoring as key compliance skills.
- Priority topics for future training programmes are decarbonisation technologies, new SCMs, alternative fuels & biomass, and circularity & digitalisation. Emerging issues such as cyber security, plant safety and stakeholder management with lower ratings but increasing relevance.





## Summary of key findings – Future skills and training requirements (Part 2)

- On-the-job and blended learning are seen as most promising training approaches for the future, with specific recommendations: expand blended learning programs by integrating e-learning with in-person training
  - invest in internal trainers and mentors by establishing a structured mentoring program
  - highlight the benefits of training by clearly linking it to career growth and development opportunities.
  - implement skills management programs to track progress and provide feedback.
- Training providers are expected to offer collaboration, hands-on workshops, and flexible learning formats.
- Trade unions expected to provide advice & information, collective agreements & partnerships in training.





## Spotlight on some key findings

- Collective agreements on employee training appear to have a very different status in the various countries. France, Belgium and Greece in particular rely more heavily on this instrument. Other dedicated agreements on training between companies and other institutions seem to exist in all countries to some extent, showing a particular importance in Spain.
- Health and safety issues arising from the use of new technologies are already part of communication activities at company level according to the majority of respondents in Spain, but much less so in other countries.
- Overall, there are similar priorities for future skills, training topics and formats in all countries, most of which are related to the decarbonisation of industry, i.e. carbon capture technologies and CO<sub>2</sub> management. There are only minor differences in the lower-ranked skills and training topics, such as knowledge of electrical infrastructure, cyber security, hydrogen and leadership. In terms of training formats, mentoring programmes are considered more important only in Greece.
- Attractiveness of the sector is reported to be positive or rather neutral in Greece and Poland. In all other countries the cement industry is, by the majority of respondents, not perceived to be an attractive sector to work in.



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# 1 Project overview

**vdz**

- The project team
- VDZ – at a glance
- Timeline
- Objectives

## Project Coordinators

**Slavica Uzelac** – EFBWW

**Miette Dechelle** – CEMBUREAU

## Project Steering Committee

Around 20 representatives from EFBWW and CEMBUREAU affiliates (countries: DE, FR, PL, ES, GR, IT, NL, BE)

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## Consultants (all VDZ)

### Manuel Mohr

- Political scientist, Master in EU-studies, law and economics
- Head of political and economical affairs department in VDZ
- 12 years experience in the sector
- Coordinator of social partner initiative in Germany

### Christina Schall

- Master in pedagogy
- Junior manager education and training department of VDZ

### Dennis Behrouzi

- Economist
- 11 years with VDZ
- Data- and market analyses, construction policies, natural resources, wastes, circular economy, resource efficiency

### Stefan Schäfer

- Chemist
- Head of environment and plant technology department in VDZ
- 25 years experience in the sector
- Head of education and training

### Vanessa Griebeling

- Master in pedagogy
- Junior manager education and training department of VDZ

### Adam Aach

- Master in Politics and Public Administration
- Junior manager climate and energy policy

Globally recognized research and competence center for cement and concrete

## Service & Consulting

As an international technical and scientific service provider for the cement and building materials industry, VDZ provides full services in cement, concrete and environmental protection. With our interdisciplinary team of experts, we cover the entire value chain from one source.

## Certification

Certification is a separate, independent and non-partisan area supplementary to VDZ's service portfolio. It is performed by the recognised autonomous certification body VDZ Cert. This ensures the independent monitoring and certification of construction products to satisfy the protective purposes of the Construction Products Regulation and the Federal State Building Codes.

## Research

VDZ pools the joint activities of German cement manufacturers to promote knowledge, technology and research and development in the field of manufacture and use of hydraulic binders. Innovations drive our daily objective: To shape the future of the cement and concrete industry.

## The Association

VDZ (Verein Deutscher Zementwerke) is the economic, technical and scientific association for the German cement industry. Its aim is to uphold and promote the joint economic interests of the cement industry and to promote technology and science, including pre-competitive research and development in the field of manufacture and use of hydraulic binders.



## Contents and guiding questions

### External Context

- European Green deal
- Just Transition Mechanism
- European Skills Agenda
- Transition pathways

### Status Quo and Future Skills Requirements

- Focus: Professional and digital skills

### Education and Requirement for Training in the Future

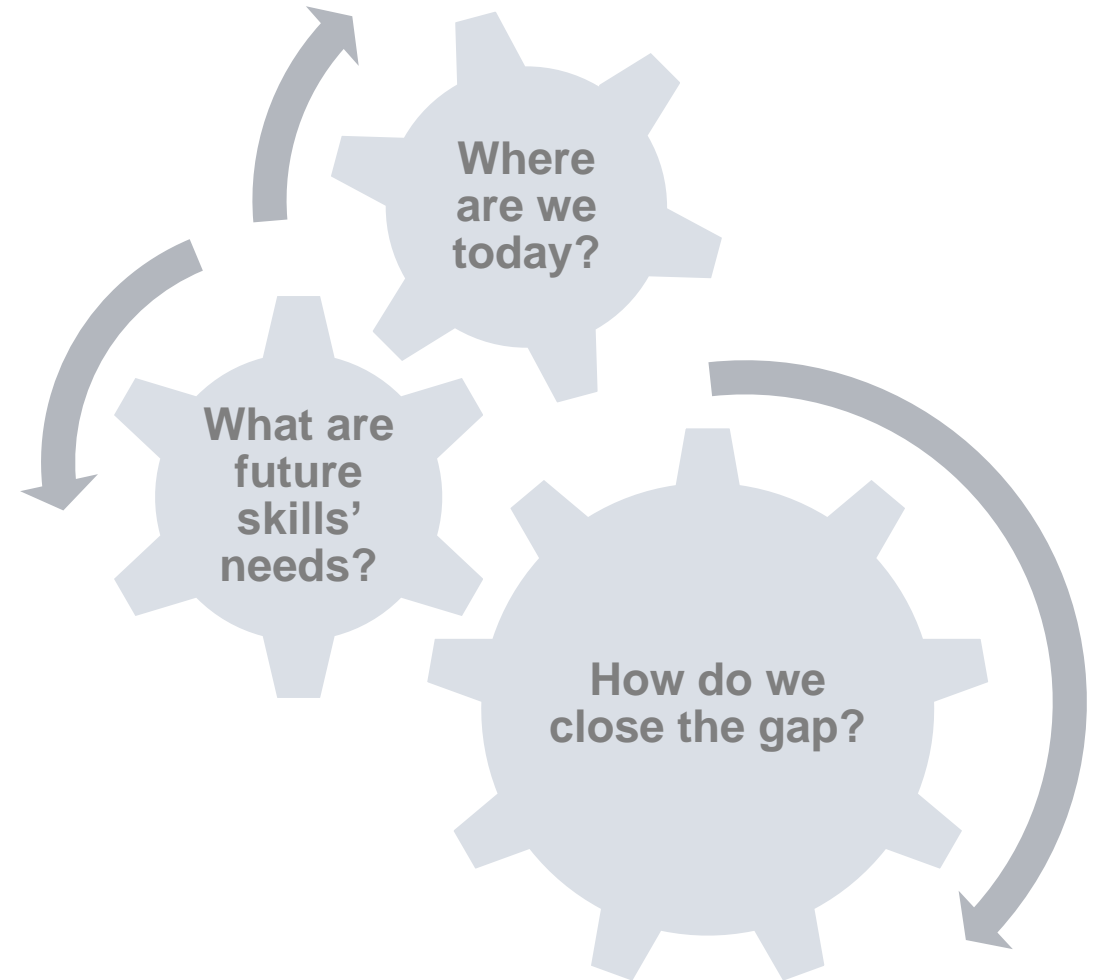
- Future education, training and new leadership
- Demographic change and attractiveness of the sector

### Case Studies

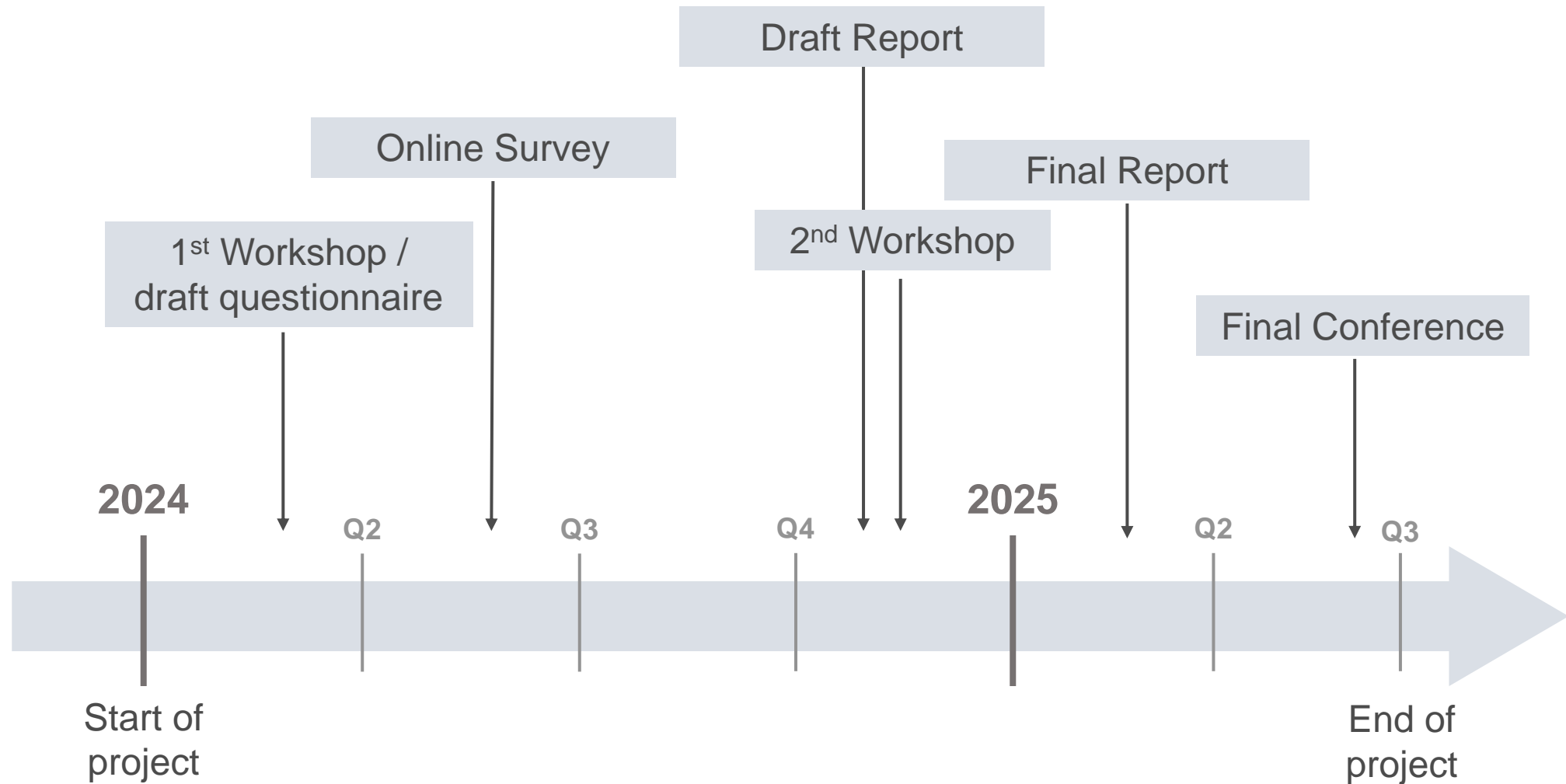
- Belgium, France, Germany, Poland, Greece, Spain

### Workshops, Online Survey & Report

### Policy Recommendations



## Timeline and milestones



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## **2 The transformation(s) of the cement industry – external context**

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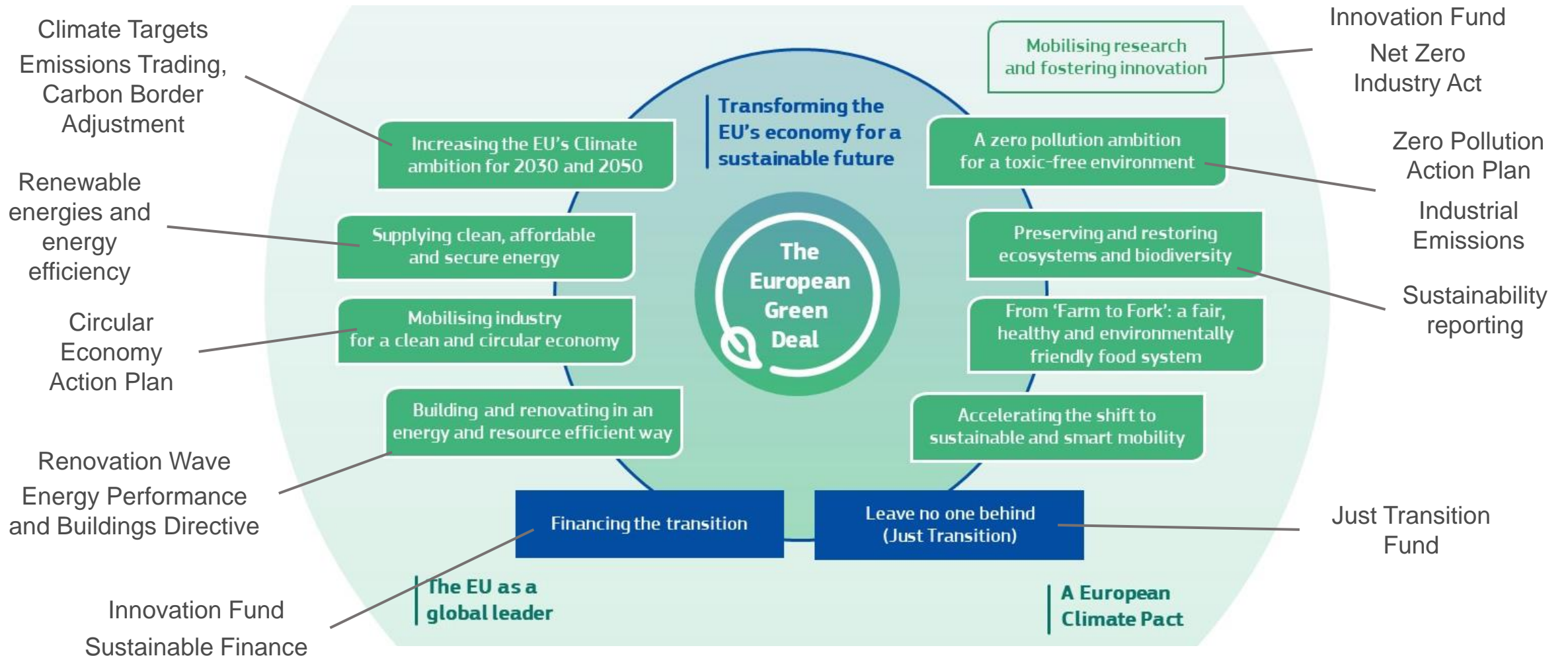
- European Green Deal
- Just Transition Mechanism
- European Skills Agenda
- Transition pathways

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## 2.1 EU Green Deal

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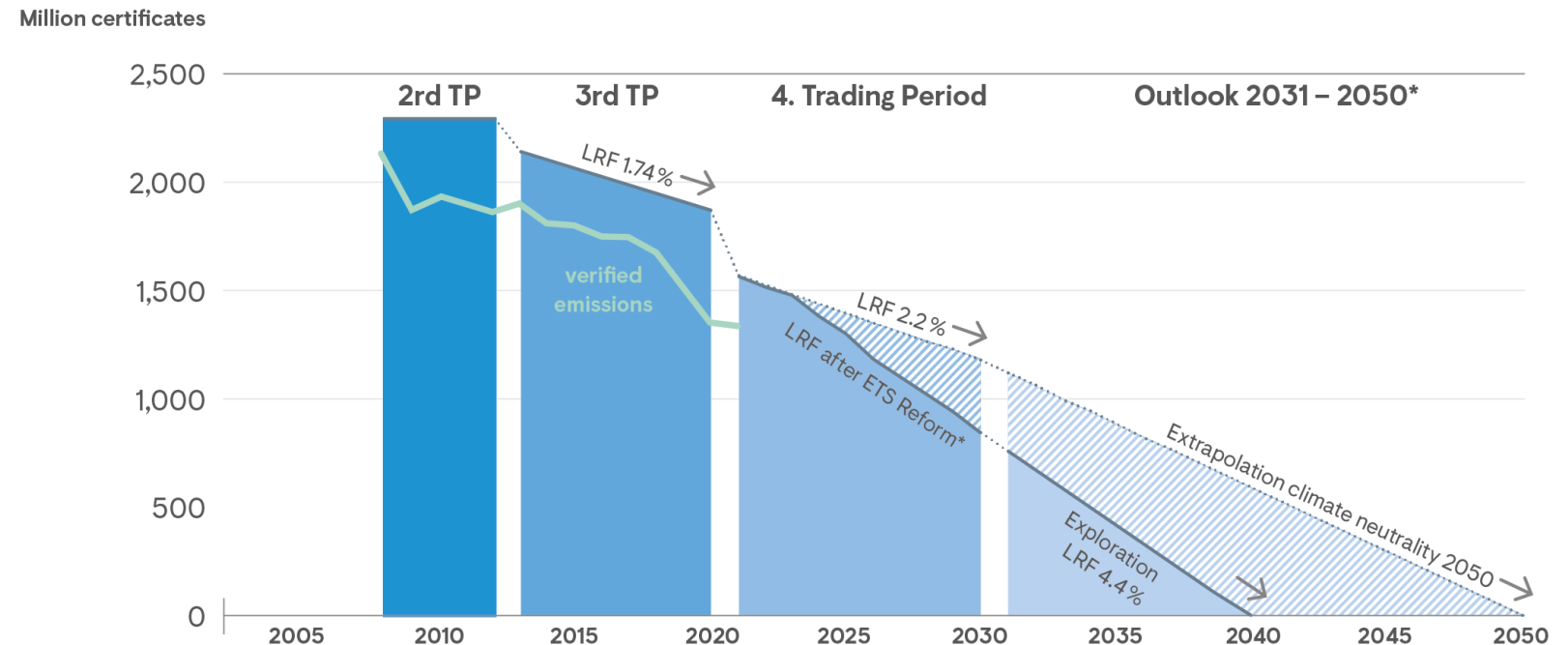
## Overview



# Emission Trading System (ETS)

## Evolution of emission budget – „pacemaker“ for the decarbonisation of the cement sector

- The cement industry (clinker production) is covered by the EU ETS.
- The EU ETS sets an overall emissions budget that decreases over time at increasingly stringent annual reduction rates.
- With the latest reform, free allocation to the cement sector will end from 2034, and the EU ETS requires climate neutral production, with the emissions budget reaching zero around 2040.



Sources: VDZ based on Federal Environment Agency, EU Commission, EU ETS Directive

\* Assumptions for projection: Update of the original reduction path (linear reduction factor LRF 2.2% p.a.) with climate neutrality in the EU ETS by 2050; update of the current reduction path in the EU ETS (LRF 4.3% from 2024 and 4.4% p.a. from 2028) leads to climate neutrality around 2040. Effects not taken into account: Market stability reserve, inclusion of waste incineration plants from 2028 onwards, possible inclusion of ETS 2 (transport, buildings, other industrial plants); possible offsetting of negative emissions

## Most relevant provisions for the cement industry



### Climate targets and overall cap

- New 2030 climate target for ETS sectors: -62% instead of -43% compared to 2005
- Continued disproportionate contribution of ETS sectors to EU climate targets



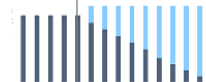
### Conditionalization of benchmark allocation

- Linking benchmark allocation to investments in energy efficiency
- Transformation plans for "worst performers"



### Accounting of CCS and CCU

- CCS recognised as CO<sub>2</sub> reduction
- CCU only with „permanent binding“
- Negative emissions: Review request for offsetting, report by 31 July 2026



### Benchmark allocation and CO<sub>2</sub> border adjustment

- Multi-year, gradual transition
- Start of BM meltdown 2026, end of BM allocation 2034 (for CBAM sectors)

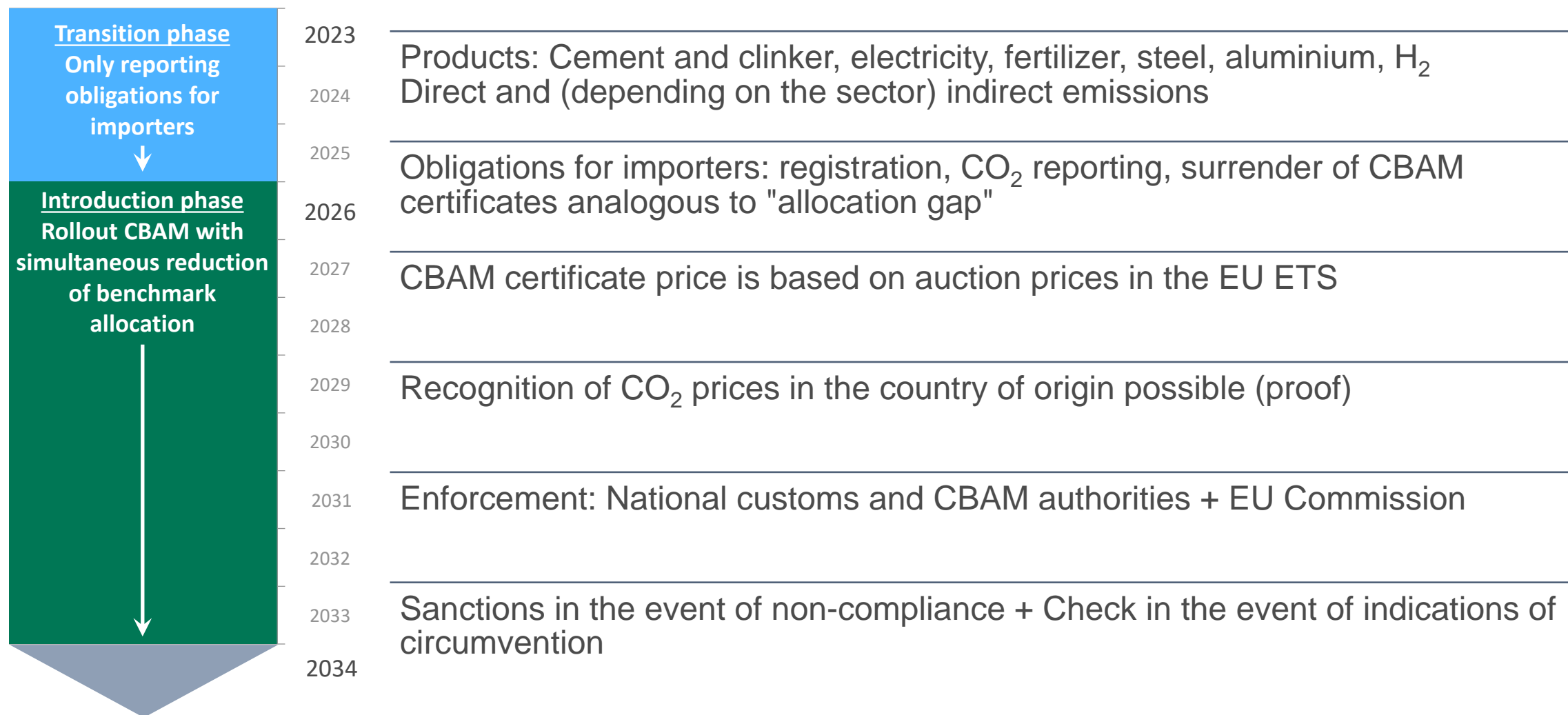


### Expansion of CO<sub>2</sub> pricing to other sectors

- New ETS 2 for buildings, transport; non-ETS industry expected from 2027
- Expansion of maritime transport from 2024, waste incineration expected from 2028

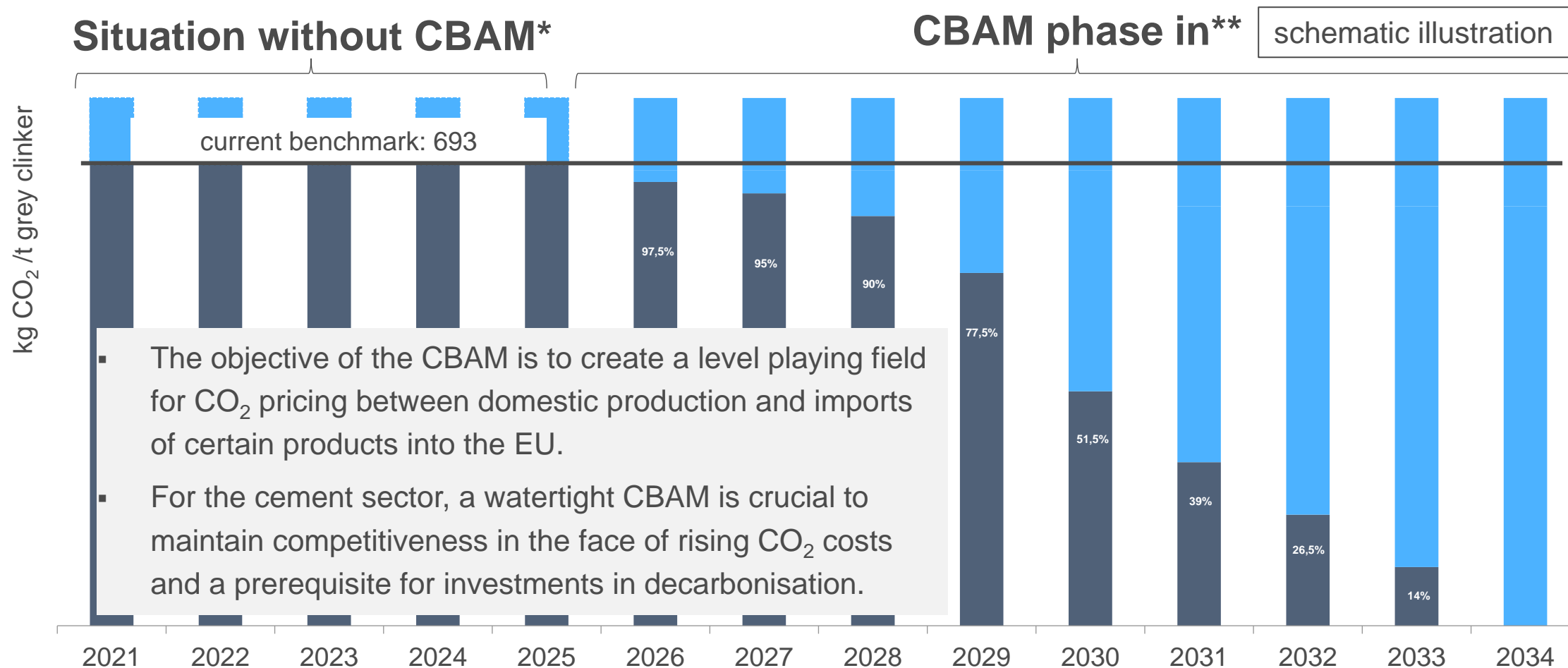
# Carbon Border Adjustment Mechanism (CBAM)

Overview – imports of clinker and cement to the EU covered by the new regulation



# Carbon Border Adjustment Mechanism (CBAM)

Phase-out of free allocation by 2034 requires watertight CBAM to maintain competitiveness



\*) CBAM pilot phase from 2023 only includes reporting obligations for importers without verification, purchase/submission of CO<sub>2</sub> certificates, no reduction in benchmark allocation

\*\*) Assumption benchmark 2026-2030: 684 kg CO<sub>2</sub> /t grey clinker; assumption benchmark 2031-2035: 630 kg CO<sub>2</sub> /t grey clinker; no CSCF

Source: VDZ based on the CBAM-Regulation ([EU 2023/956](#)) and the EU ETS Directive ([EU 2023/959](#))

# EU Innovation Fund

The EU fund for climate policy, with a focus on energy and industry

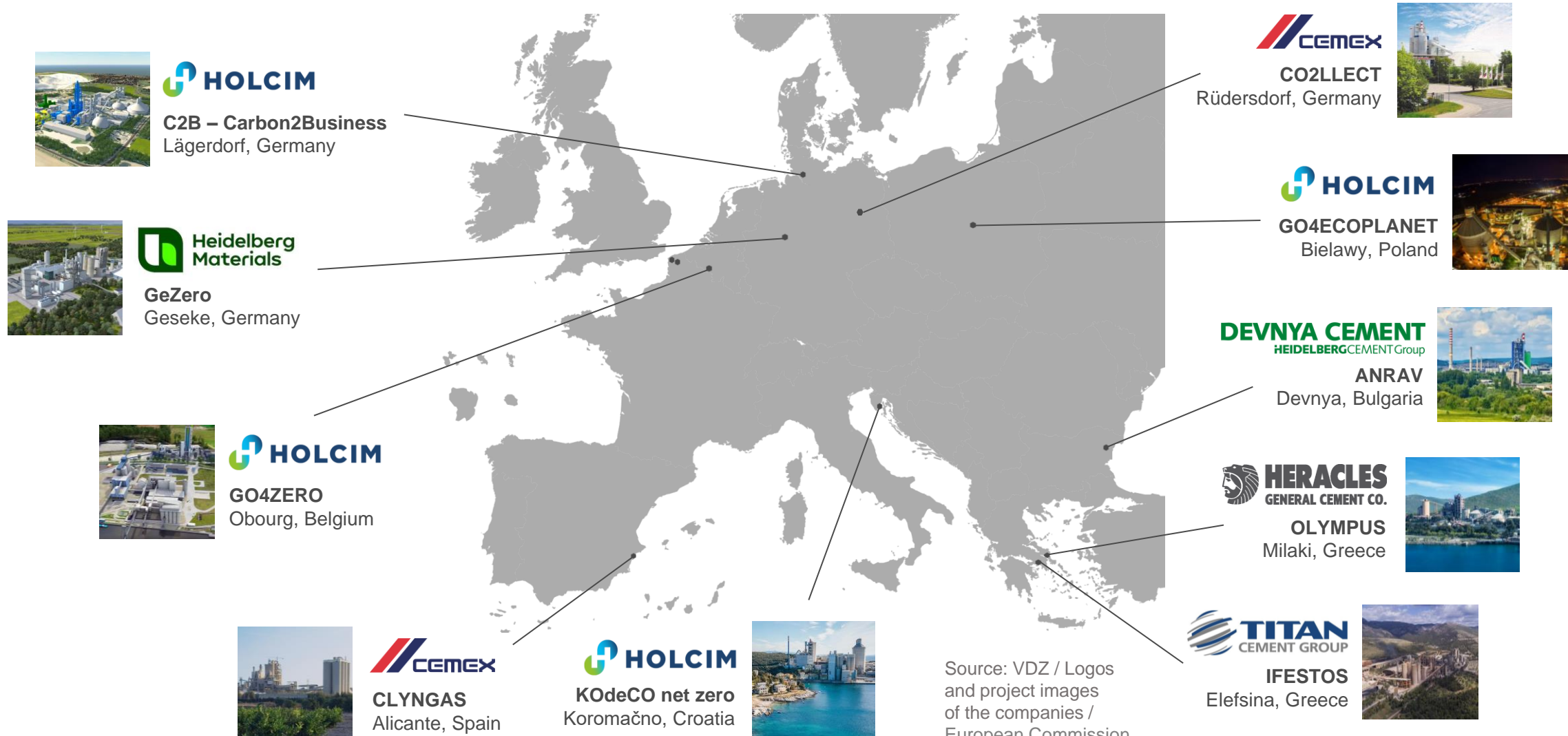


Source: [European Commission](#)

- The EU Innovation Fund is designed to support the development and deployment of innovative low-carbon technologies in Europe by providing substantial financial support for breakthrough innovations in sectors that are crucial to this transition.
- It supports projects that can contribute significantly to reducing greenhouse gas emissions, as well as those that promote a circular economy and enhance energy efficiency.
- The fund is geared toward large-scale projects of energy-intensive industries, renewable energy, energy storage, carbon capture, utilization, and storage (CCUS), and low-carbon hydrogen.

## Selected\* Projects in the cement industry

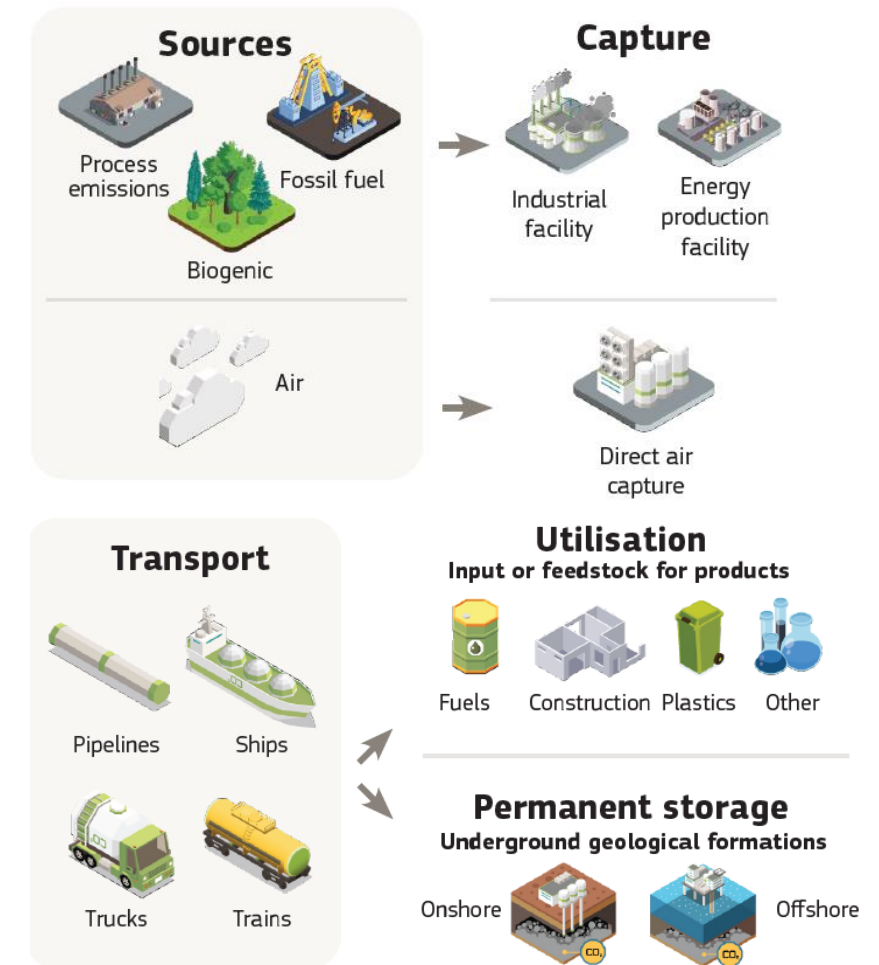
\*only approved projects are considered



# EU Industrial Carbon Management Strategy (ICMS)

Important foundation for CCUS deployment in the cement sector – but implementation is key

- Sets out the framework, objectives and areas for action for CO<sub>2</sub> capture, transport, storage and utilisation (CCS/CCU), including negative emissions ("carbon removals").
- Targeted capture volumes in the EU ~50 million tons/year by 2030, from 2040 ~280 million tons/year and from 2050 ~450 million tons/year of CO<sub>2</sub> in the EEA
- By 2030, capture of CO<sub>2</sub> from process emissions ~90% of total capture volume. By 2040, ~45% process emissions and ~45% biogenic & atmospheric CO<sub>2</sub> of total capture volume. By 2050 biogenic CO<sub>2</sub> and direct air capture (DACCS) expected to dominate with share of ~60%.
- CCU for production of synthetic fuels, chemicals, polymers or minerals
- Multimodal, cross-border CO<sub>2</sub> transport by pipeline, rail, road, ship with first hubs by 2030. From 2040 preferably through pipeline infrastructure, estimated to be 19,000 km long and costing €16 billion in 2040
- Comprehensive regulatory package and demand platform planned, including accounting rules for transport & use in products by 2026



Important EU initiatives for deploying and scaling CCUS projects in Europe

## Net Zero Industry Act (NZIA)

- Promotes domestic production of net-zero technologies to achieve climate targets and strengthens Europe's international leadership in green industrial technologies
- Sets target of 50 Mio. t annual injection capacity in strategic CO<sub>2</sub> storage sites in the EU by 2030
- Establishes CO<sub>2</sub> capture and storage (CCS) as an economically viable climate solution, in particular for hard to abate energy-intensive sectors
- Accelerates permitting procedures for the deployment of strategic decarbonization technologies

Source: [European Commission](#)

## CCUS Forum



WG on CO<sub>2</sub>  
infrastructure



WG on industrial  
partnership for CCUS



WG on public  
perception



WG on the CCUS  
Strategy

Source: [European Commission](#)

# Renewable Energy Directive (RED)

Relevant for the use of biomass, CCU and hydrogen in clinker production

## Biomass waste

- Defines sustainability requirements for biomass crediting
- RED I: Only GHG calculation required for liquid waste
- RED II: Extension to solid and gaseous waste



Source: [Vecoplan](#)

## Carbon Capture & Utilization (CCU)

- Sets requirements for industrial carbon sources (Delegated Act)



Source: [Umweltbundesamt](#)

## Green hydrogen – Rules for the production of RFNBO

- *Additionality* (Art. 5): Simultaneous increase of renewable electricity
- *Temporal correlation* (Art. 6): Electricity must be consumed by the electrolyser in the same hour as it was fed in
- *Geographical correlation* (Art. 7): The renewable energy plant is located in the same bidding zone as the electrolyser



Source: [European Commission](#)

## Air pollution in focus – with significant effects on industrial permitting procedures

- In May 2021, the EU Commission adopted its Action Plan: "Towards a Zero Pollution for Air, Water and Soil" including a zero pollution vision for 2050 (see illustration).
- During the publication of this plan, the EU revised two important directives: the Industrial Emissions Directive (IED) and the Ambient Air Quality Directive (AAQD).
- The IED is the most important regulatory basis for the authorization, operation, monitoring and decommissioning of environmentally relevant industrial installations, such as cements plants. With its revision it introduces mandatory environmental managements systems and a more ambitious approach for limiting air pollution.
- In addition, the AAQD sets new immission limit values for dust, nitrogen oxide and sulphur dioxide to be applied by 2030. Both directives tend to make industrial transformation more challenging regarding permitting procedures.



- ➔ **Air:** reduce by more than **55%** premature deaths caused by air pollution;
- ➔ **Water:** reduce waste, plastic litter at sea by **50%** and microplastics released into the environment by **30%**;
- ➔ **Soil:** reduce nutrient losses and chemical pesticides' use by **50%**;
- ➔ **Biodiversity:** reduce by **25%** the EU ecosystems where air pollution threatens biodiversity;
- ➔ **Noise:** reduce by **30%** the share of people chronically disturbed by transport noise;
- ➔ **Waste:** reduce significantly total waste generation and by **50%** residual municipal waste.

### The zero pollution vision for 2050:

Air, water and soil pollution is reduced to levels **no longer harmful to health and natural ecosystems** thus creating a toxic free environment.

## Another focus on the reduction of harmful chemicals

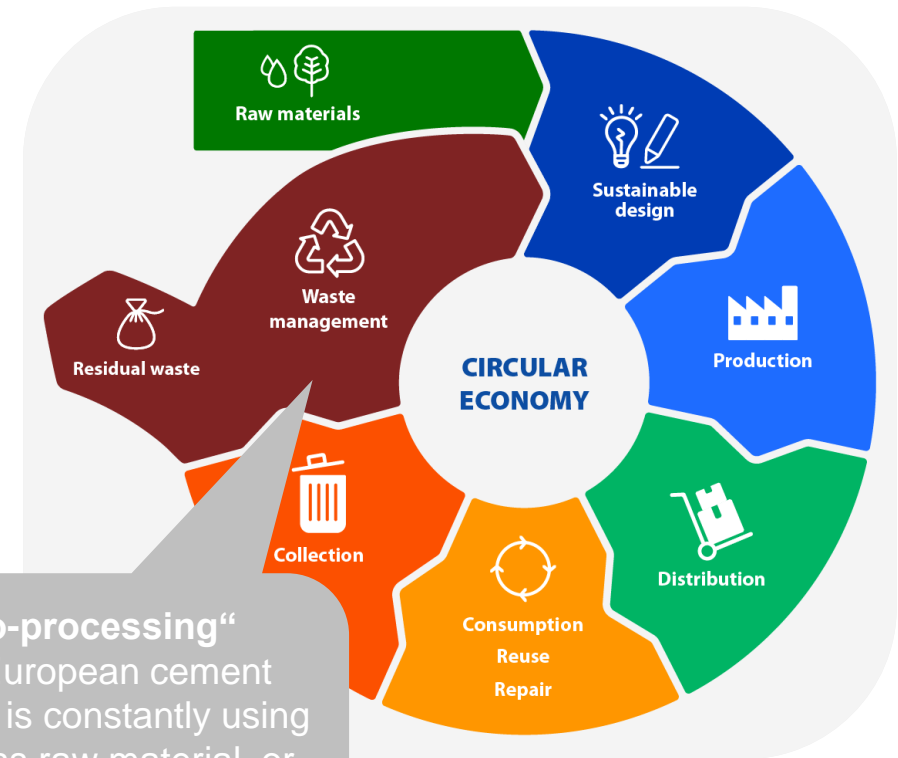
- The EU's Zero Pollution Ambition also focuses on harmful chemicals and aims to stimulate innovation by promoting the use of safer and more sustainable chemicals - part of the EU's Chemicals Strategy for Sustainability.
- REACH and CLP regulations are the instruments to achieve these goals and are managed by the European Chemicals Agency ECHA.
- REACH restricts the content of soluble chromium VI in cements, requiring knowledge of how to handle reducing agents.
- Phase out of per- and polyfluoroalkyl substances (PFAS) in the EU becomes more important. It is expected that fuels for the clinker burning process will contain more PFAS, which will require skills for appropriate handling and monitoring.



# Circular Economy Action Plan

A strategy that has led to several adaptations of EU legislation relevant to cement and concrete.

- In March 2020 the EU Commission adopted a new circular economy action plan to create a "coherent framework" for sustainable products, a functioning EU internal market for secondary raw materials and to reduce wastes.
- On this basis several European legal acts were revised, such as the Ecodesign for Sustainable Products Regulation (ESPR) or the new Construction Products Regulation (CPR).
- While the CPR applies to EU wide harmonised products, such as cement, ESPR applies to anything else, such as concrete. It "reinforces the range of ecodesign requirements that can be set for products, which can comprise requirements relating to durability, circularity and the overall reduction of the environmental and climate footprint of products, amongst many others." The CPR goes a similar way and requires to extend their declaration of conformity with additional information such as the CO<sub>2</sub> footprint.



**“Co-processing”**  
The European cement industry is constantly using waste as raw material, or source of energy to replace natural mineral resources and fossil fuels

# Energy Efficiency Directive (EED)

Obliges EU member states and companies to increase their energy efficiency

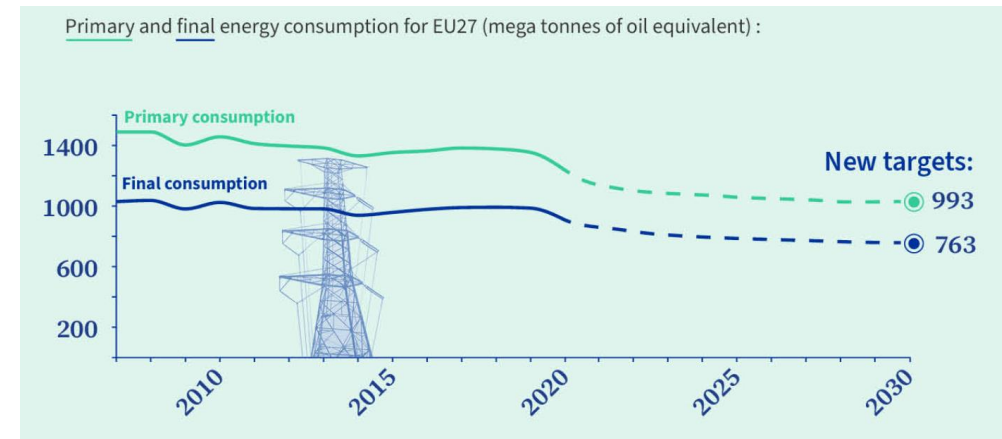
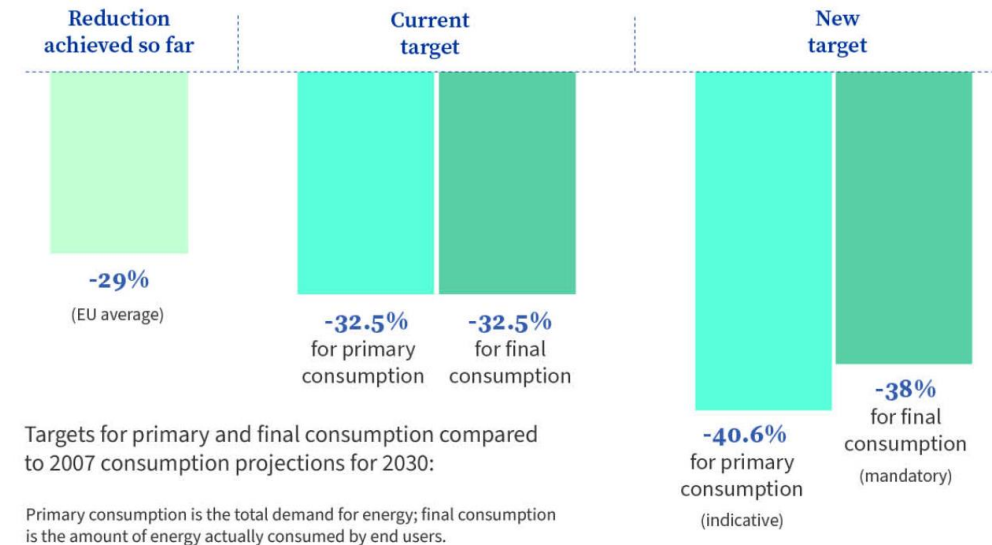
## Key objectives

- -11.7% final energy consumption by 2030 compared to 2020
- From 2025 -1.3% p.a., gradual increase to -1.9% p.a.
- Reduction targets for primary energy consumption not binding
- 3% refurbishment rate for public areas
- -1.9% p.a. energy consumption

## Relevant provisions

To improve energy efficiency, all companies in Europe should recover waste heat and are required to implement...

- Energy audits → obligation from  $\varnothing$ -total consumption > 10 TJ ( $\approx$  2.8 GWh) p.a. in the last three years, as well as
- Energy management systems → obligation from  $\varnothing$ -total consumption > 85 TJ ( $\approx$  24 GWh) p.a. in the last three years



Source: [European Council](#)

# Energy Performance of Buildings Directive (EPBD)

Aims to boost the energy performance of buildings – the thermal mass of concrete can be a solution

## Together with the EED, the directive promotes policies that will help

- Achieve a highly energy efficient and decarbonised building stock by 2050
- Create a stable environment for investment decisions
- Enable consumers and businesses to make more informed choices to save energy and money

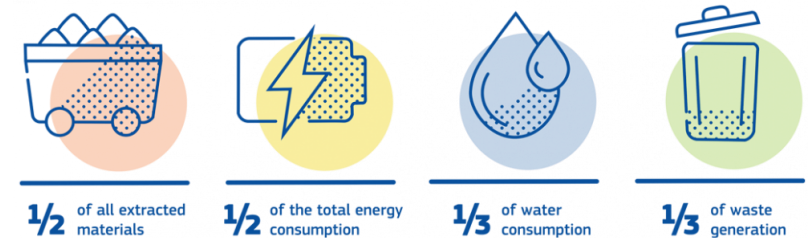


Source: European Commission

## Level(s)

- Assess the environmental performance of buildings throughout the full lifecycle
- 16 indicators linking buildings with EU sustainability priorities
- Level(s) is divided into three areas
  1. Resource use and environmental performance
  2. Health and comfort
  3. Cost, value, and risk

Based on a building's full lifecycle, the building sector is responsible for:

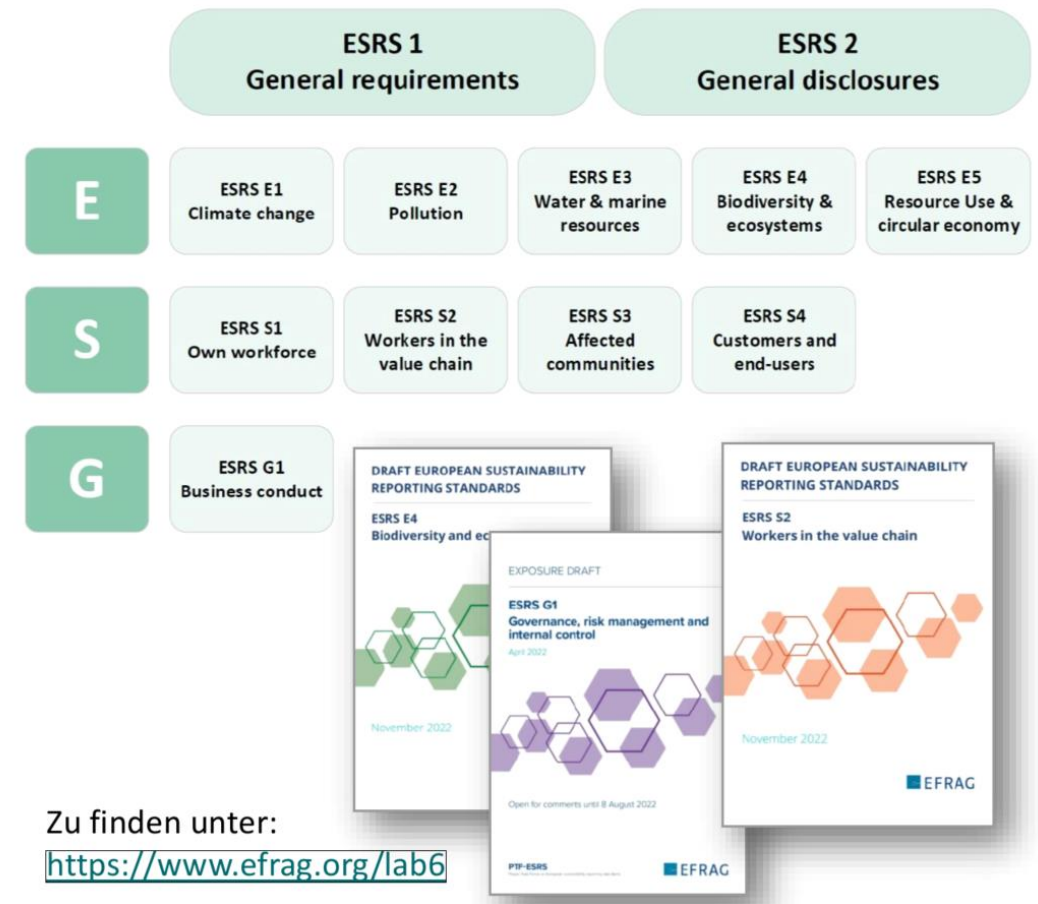


Source: European Commission

# EU Sustainability Reporting

## New and comprehensive reporting obligations for the European cement industry

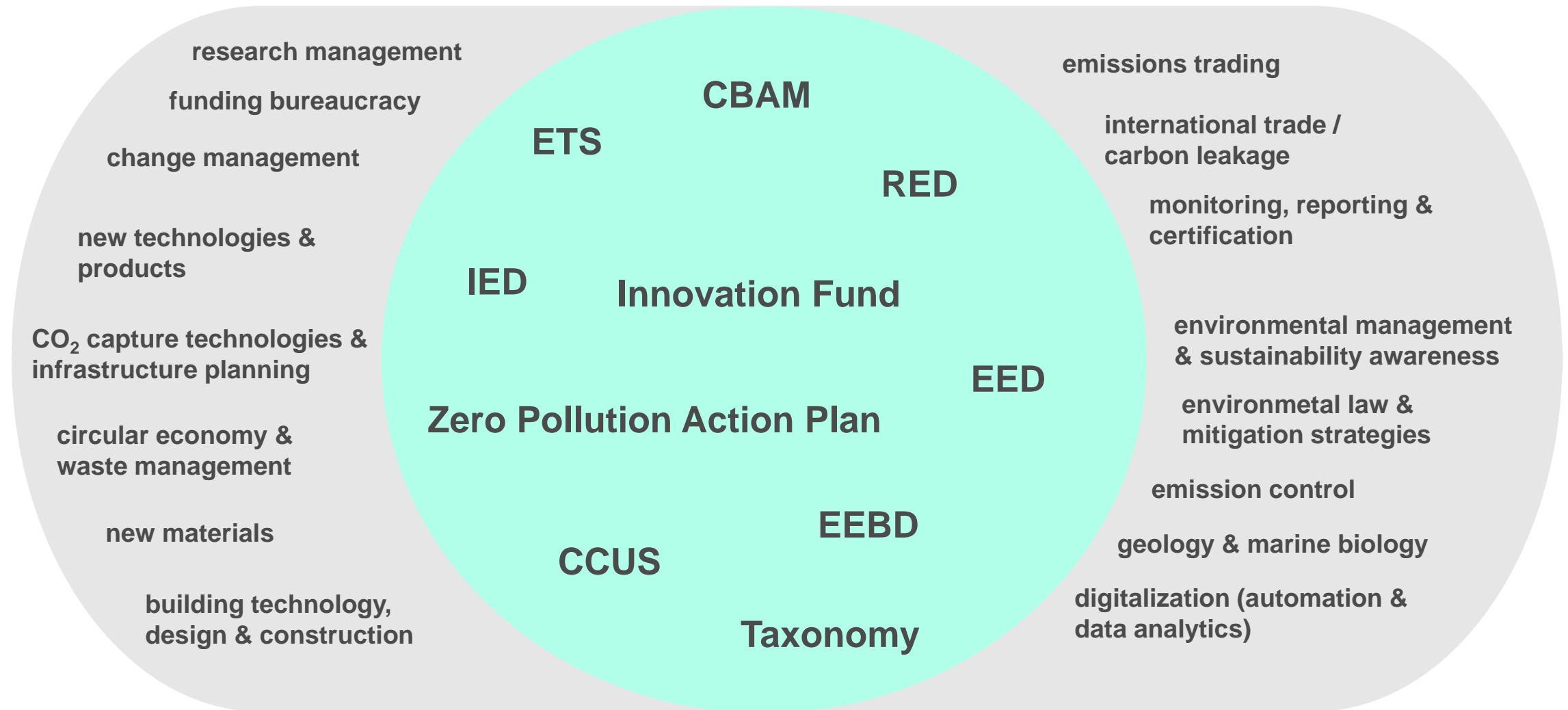
- Almost all cement companies have to add a sustainability report to their annual management report (for financial year 2024 at the earliest, 2028 the latest – depending on the size of the company and whether possibility to opt-out is used by small and medium enterprises).
- The sustainability report must include the information required to understand the impact of the activities of the corporation on sustainability aspects and the impact of sustainability aspects on the business' financial performance.
- This includes information about ecological, social and governance sustainability aspects based on the European Sustainability Reporting Standards (ESRS) developed by EFRAG.
- Companies must perform a materiality assessment to evaluate which single data points are necessary to report.



## Reporting increasingly important for corporate lending

- The EU is examining how to make sustainability considerations an integral part of its financial policy in order to meet the targets of the Green Deal.
- Sustainability Reporting is part of this initiative to channel capital flows primarily into sustainable investments.
- Companies required to publish a sustainability report must also include information required by the EU Taxonomy Regulation, which specifically addresses the cement industry and defines, among other things, when turnover from the sale of cement and clinker complies with the regulation.
- Taxonomy compliance for the cement industry can only be achieved by reducing the carbon footprint below 469 kg CO<sub>2</sub> per tonne of cement or 722 kg CO<sub>2</sub> per tonne of clinker. In addition, cement companies must meet certain minimum social protection standards and must also comply with "Do no significant harm" criteria, e.g. for biodiversity or pollution.





Cement manufacturing and products are affected by almost all policy areas

- The cement industry is affected by almost all elements of the Green Deal with the EU Emissions trading scheme (EU ETS) and the Carbon Border Adjustment (CBAM) being the key policy areas for the transformation and the competitiveness of the sector in Europe.
- Zero pollution policies also have a strong impact on the success of the transition, especially with regard to the Industrial Emissions Directive as the basis for permitting procedures.
- The increasing complexity of the regulatory framework and reporting requirements is challenging cement producers across Europe, placing a heavy administrative burden on companies and requiring new skills and personnel to comply with new regulations.
- Looking at the whole value chain of cement and concrete, new requirements and skills for the use of building materials, the whole life cycle carbon footprint of buildings, the development of lead markets for low carbon and near zero building products are becoming increasingly important for the industry.



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## 2.2 Just Transition Mechanism

**vdz**

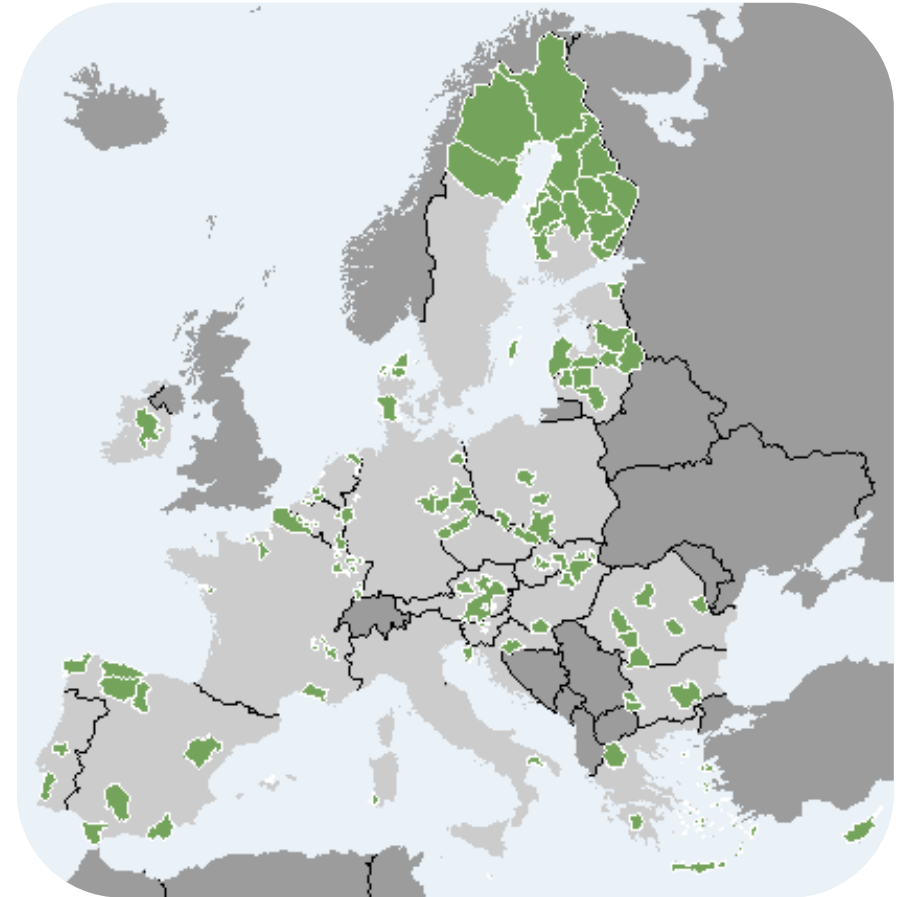
# Just Transition Fund (JTF)

Mitigate the socio-economic impact of the green transition with ~€55 billion between 2021-2027

- Addresses the social and economic effects of the green transition
- Focus on regions, industries and workers who will face the greatest challenges
- 67 territorial just transition plans (TJTPs)
- 93 different areas
- Coal/peat/oil shale regions + regions with carbon-intensive industries
- EUR 25.4 billion (incl. co-funding)

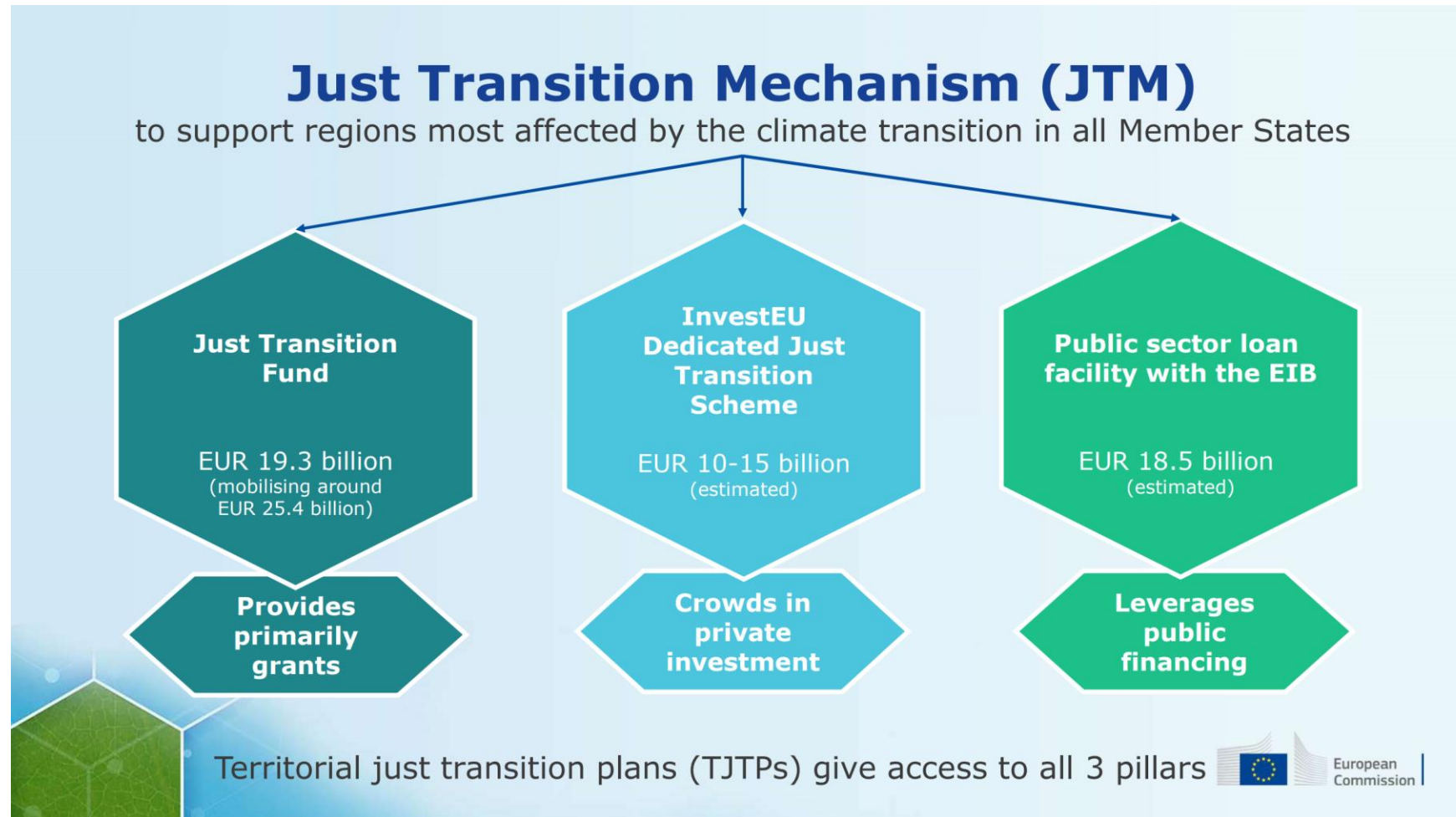
Sources: [The Just Transition Mechanism](#); [European Commission](#)

Approved territorial just transition plans



# Just Transition Fund (JTF)

Mitigate the socio-economic impact of the green transition with ~€55 billion between 2021-2027



Source: [European Commission](#)

Who will benefit and how?



## People and citizens

- facilitate employment opportunities in new sectors and those in transition
- offer re-skilling opportunities
- improve energy-efficient housing and facilitate access to clean, affordable and secure energy



## Companies and sectors

- support climate-resilient investments and jobs by creating attractive conditions
- provide easier access to loans and financial support
- invest in the creation of new firms, SMEs and start-ups as well as research and innovation



## Member States and regions

- creating new jobs in the green economy
- investing in renewable energy sources, energy infrastructure, district heating and transportation
- improving digital connectivity and sustainable public transport
- providing affordable loans to local public authorities and technical assistance

# Just Transition Fund (JTF)

Supporting investments to reduce GHG emissions from ETS activities including in the cement sector

## Funding conditions

- only for industrial installations
- to reduce GHG emissions significantly below the ETS benchmark
- when needed to protect a significant number of jobs
- investments should contribute to the just transition in the relevant territory

## Cement projects included in TJTPs (i.a.)

- |   |   |                |
|---|---|----------------|
| ▪ Istria, Croatia → CCS                     | } | <i>granted</i> |
| ▪ Gotland, Sweden → CCS                     |   |                |
| ▪ Antoin, Belgium → CCS                     | } | <i>pending</i> |
| ▪ Obourg, Belgium → <i>Circular economy</i> |   |                |



Source: [European Commission](#); [Cohesion Open Data Platform](#)

# Just Transition Fund and the cement sector

The JTF can be an additional source of funding for companies in dedicated regions

- In dedicated regions the JTF can alleviate the socio-economic impact of the green transition also in the cement sector.
- Different types of projects can be eligible for funding, especially investments in the decarbonization of cement production as well as reskilling and upskilling of employees.
- Investments in digital infrastructure and education as well as training of the workforce are also included in the JTF scope.
- Several projects in the cement industry have already secured funding, all of which focus on the technical transformation of the respective plants. Others could follow.
- Together with the Innovation Fund, the JTF forms an important EU funding framework that provides financial support to cement manufacturers in Europe on the challenging path of decarbonizing their production.
- An application or even a commitment to the JTF also increases public awareness of the respective decarbonization projects.



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## **2.3 European Skills Agenda**

**vdz**

## Background and context

### Why a skills agenda?

Four simultaneous disruptions will influence the transition to a resource-efficient, circular, digital and climate-neutral economy and will lead to a transformation of the world of work:

#### **igitalization**

Use of digital data, algorithms and AI as a production factor and component of improved production process.

#### **ecarbonisation**

Tightening of climate targets through the EU Commission's Green Deal requires transformation of the cement industry through the development and application of new technologies.

#### **emography**

Decrease in the supply of skilled workers, especially STEM workers, who are relevant for innovation.

#### **eglobalization**

The weaknesses of globalized capitalism in the corona crisis must be compensated by securing supply chains and domestic production.

The shortage of skilled workers could become a serious obstacle to achieving the EU's green transition: Employees having the right skills will be the key to success!

## Overview and objectives

- Launched in 2020 (updated in March 2023) to support individuals and businesses in developing new the right skills in a changing work environment.
- Demographic change, artificial intelligence, robotics, twin and digital transitions are expected to create new jobs while other jobs will change or disappear: Lifelong learning is crucial for long-term and sustainable growth, productivity, and innovation; it is a key factor for the competitiveness of businesses.
- The Skills Agenda sets ambitious goals: 78% employment rate by 2030 and at least 60% adult participation in training yearly, requiring training for around 50 million additional workers annually.
- It is closely coordinated and aligned with the European Pillar of Social Rights, the European Industrial Strategy, and the European Green Deal.



Call for collective action to mobilize businesses, social partners, and stakeholders for collaboration within the EU's industrial ecosystems.



Defines a clear strategy to ensure that skills lead to jobs.



Helps people build their skills throughout life in an environment where lifelong learning is the norm.



Identifies the financial means to foster investment in skills.

### Sources:

European Commission. European Skills Agenda for Sustainable Competitiveness, Social Fairness and Resilience.

European Commission. European Skills Agenda: progress on the 11 flagship actions (2023).

# EU action plans based on the European Skills Agenda

Accelerating implementation of initiatives and maximising the potential of EU funding is essential

## Pact for skills

- promoting cross-sector skills partnerships to develop targeted training initiatives
- 20 sectoral partnerships have been set up with the pledge to upskill more than 10 million people

## European skills partnerships

- support of common training standards for european labour market needs
- Establishment of specialized academies for skills in renewable energy and hydrogen technology

## Upskilling Pathways

- Providing access to basic and advanced training opportunities for low-skilled adults
- Promoting lifelong learning through personalized learning pathways and qualification programs

## Digital Education Action Plan

- to enhance the quality, inclusivity and accessibility to digital education,
- to support the adaptation of Member States' education and training systems to the digital era
- to increase participation in digital skills training.

## Labour & Skills Shortages Action Plan

- the activation of under-represented people in the labour market;
- improving working conditions in specific sectors
- improving fair intra-EU mobility and attracting talent from outside the EU

## European year of skills

- Supporting collaboration among EU countries to exchange best practices in skills development
- Over 2,000 events and 190 initiatives, including the establishment of EU Skills Academies in key areas such as solar energy and cybersecurity.

# The role of the cement sector in the context of the EU skills agenda **vdz**

## Steps to align with EU initiatives and action plans

- The New Skills Agenda serves as the foundation for several EU initiatives and action plans.
- The implementation of the initiatives must be accelerated and the potential of EU funding opportunities has to be better utilized.



- Define a clear strategy and analyze which future and professional skills will be crucial for the transition
- Collect information on skill requirements and skill mismatches to develop competence objectives
- Design individual learning concepts for different target groups instead of one size fits all solution

### ① First step: Gap Analysis

- Where are we on education, skills and training of employees in the cement industry today?
- What are the future skills' needs?
- How do we close the gap?

### ② Second Step: Policy Recommendations and future training concepts

- How do we close the gap?
- How do we manage to train the right skills?

Various strategies and action plans with fairly limited positive impact on companies

- European Skills Agenda provides overall framework for skills policy in the EU. A number of action plans and measures have been launched as a result. However, the impact "on the ground" in the cement industry is limited. Policies should be more tailored to industry-specific needs and realities to make EU support more actionable.
- There is a lack of wider understanding of how to take advantage of available support schemes or benefit from concrete actions at national level. The initiatives and actions are often complex, with varied eligibility criteria, application processes and specific sectoral requirements that can be challenging for companies to navigate.
- EU and national skills policies should in future be more responsive to the specific needs of enterprises and workers, in order to ensure transparency about what is actually being done and how enterprises' education, lifelong learning, retraining and upskilling strategies can actually benefit from the instruments at their disposal.



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## 2.4 Transition Pathways

**vdz**

# What are the main levers to reduce CO<sub>2</sub>?

Effectively reducing the industry's carbon footprint will include the whole value chain

- **Clinker:** Improving thermal efficiency and replacing fossil fuels by alternative fuels with biogenic content. Beyond that the decarbonisation requires to capture the CO<sub>2</sub> that cannot be reduced otherwise.
- **Cement:** Reducing clinker content through substitution with supplementary cementitious materials (SCMs), such as fly ash, ground granulated blast-furnace slag or calcined clay and using new binders with smaller CO<sub>2</sub> footprint.
- **Concrete:** Increasing the efficient use of binders in concrete, e.g. by optimisation of mix design and a more industrialised production. Using SCMs in concrete.
- **Construction:** Increasing the material efficiency, e.g. by using hollow ceilings, carbon concrete, by increasing service life of building structures or a re-use of construction materials.
- **CO<sub>2</sub>-Uptake / Recarbonation:** During its lifetime concrete is binding CO<sub>2</sub>. That process can also be actively accelerated.



**Full decarbonisation requires breakthrough technologies, i.e. Carbon Capture and Utilisation / Storage**

# Transition pathways in the cement sector

Various decarbonization roadmaps already point the way to carbon neutrality

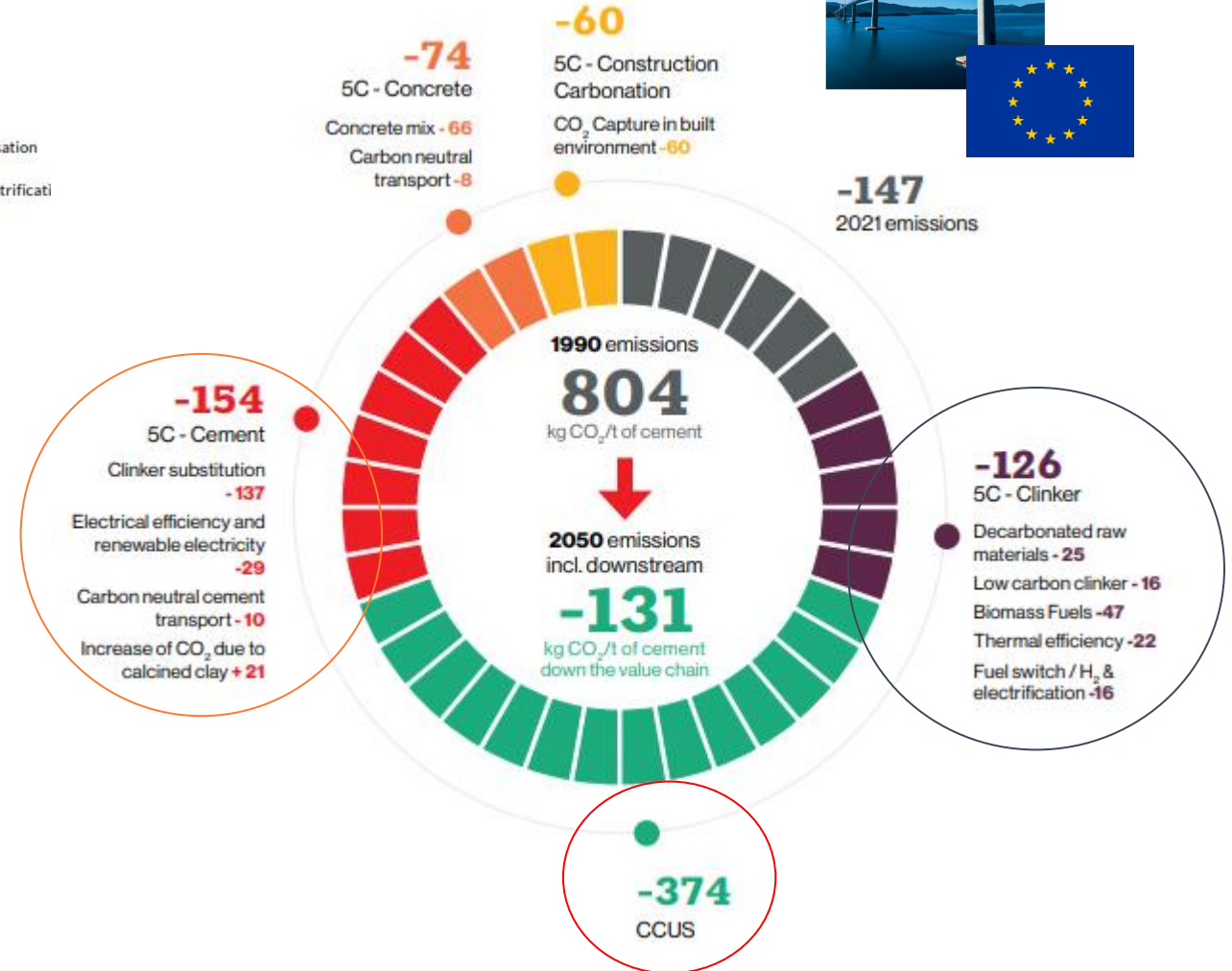
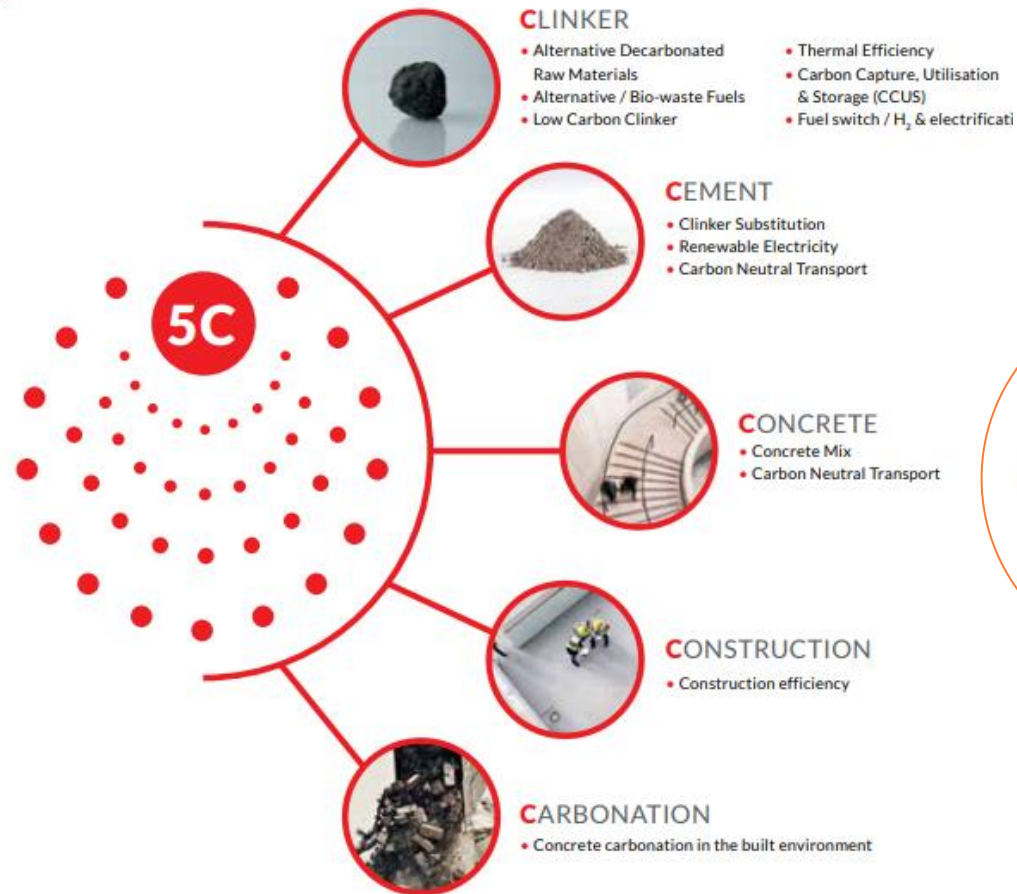


Sources: VÖZ, VdZ, GCCA, CEMBUREAU, K. Lakowski, M. Giers, France Cement

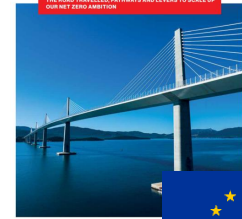
# CEMBUREAU: 2050 Roadmap

## CO<sub>2</sub> reductions along the value chain

### 5C approach decarbonisation levers

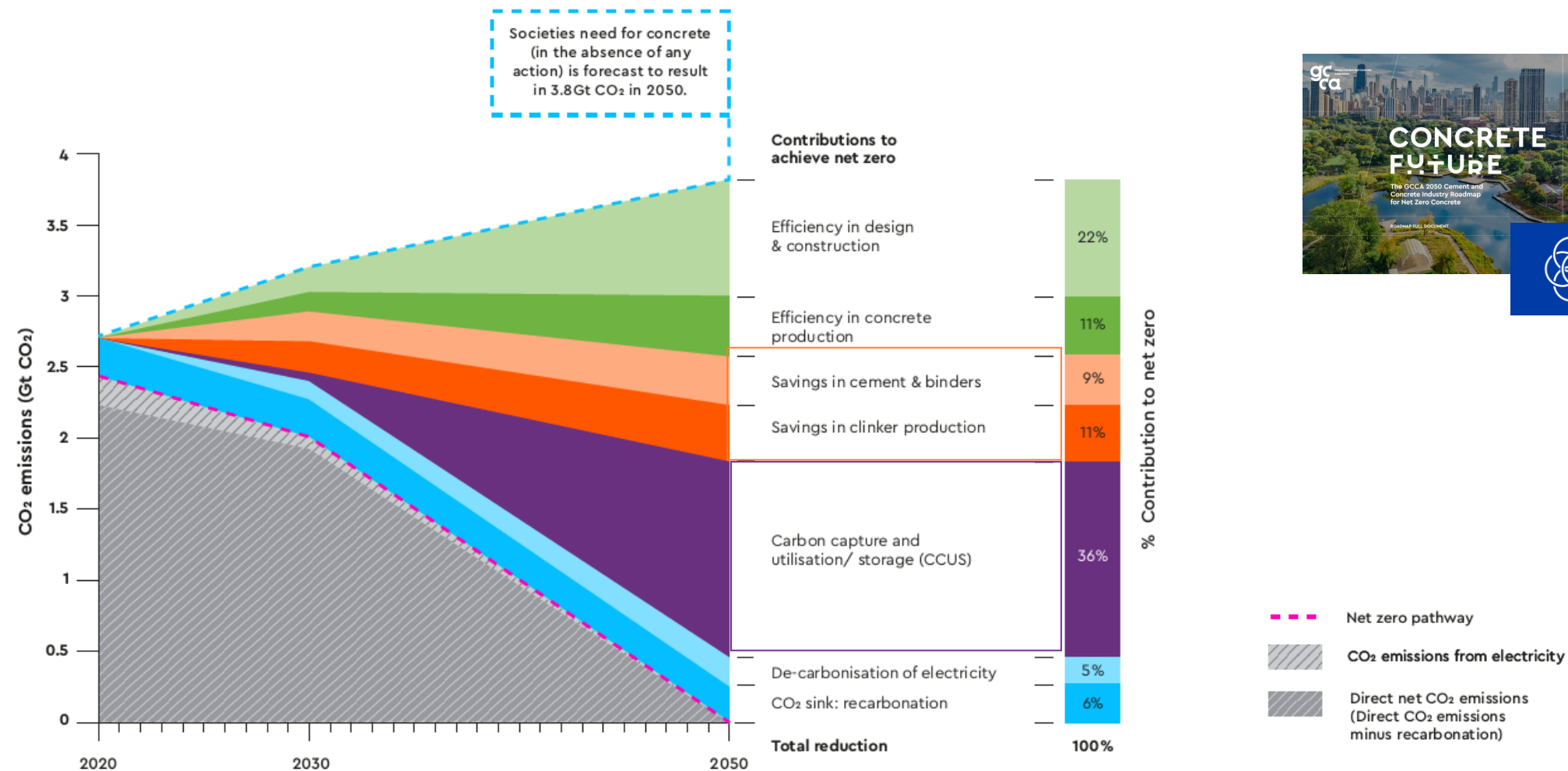


CEMBUREAU  
From Ambition  
to Deployment



vdz

# A Net-zero pathway for the global cement industry



# GCCA: Large share of actions to net-zero future in cement plants

## Clinker production

- thermal efficiency
- savings from waste fuels ("alternative fuels")
- use of decarbonated raw materials
- use of hydrogen as a fuel

## Cement and binders

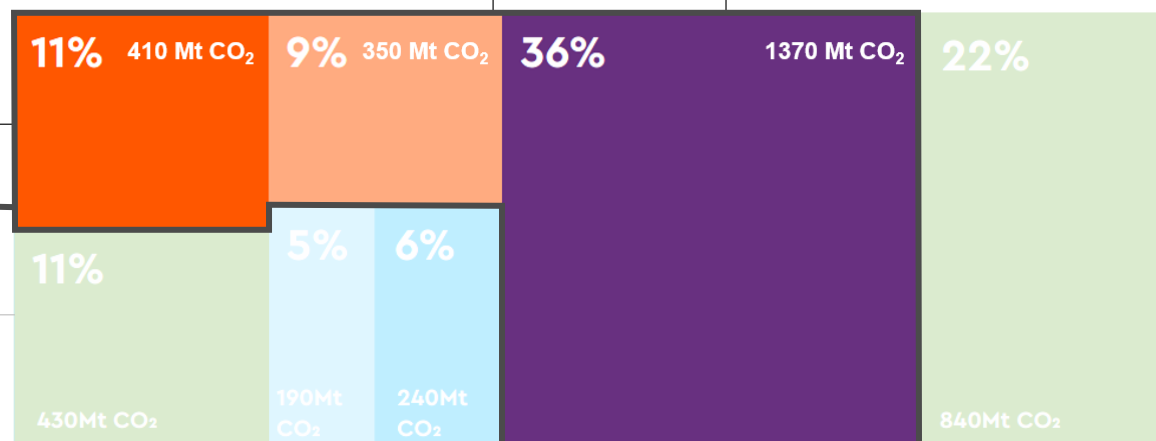
- Portland clinker cement substitution. Also expressed through clinker binder ratio
- alternatives to Portland clinker cements

## CCUS

- carbon capture at cement plants

56% share of CO<sub>2</sub> saving

PERCENTAGE CONTRIBUTION TO NET ZERO AND CO<sub>2</sub> EMISSION SAVINGS IN 2050



### Efficiency in concrete production

- optimised mix design
- optimisation of constituents
- continue to industrialise manufacturing
- quality control

### Decarbonisation of electricity

- decarbonisation of electricity used at both cement plants and in concrete production

### CO<sub>2</sub> sink: recarbonation

- natural uptake of CO<sub>2</sub> in concrete – a carbon sink

### Efficiency in design and construction

- client brief to designers to enable optimisation
- design optimisation
- construction site efficiencies
- re-use and lifetime extension



# GCCA: Large share of actions to net-zero future in cement plants

## Clinker production

- thermal efficiency
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- use of decarbonated raw materials
- use of hydrogen as a fuel

## Cement and binders

- Portland clinker cement substitution. Also expressed through clinker binder ratio
- alternatives to Portland clinker cements

## CCUS

- carbon capture at cement plants

PERCENTAGE CONTRIBUTION TO NET ZERO  
AND CO<sub>2</sub> EMISSION SAVINGS IN 2050

11% 410 Mt CO<sub>2</sub>

9% 350 Mt CO<sub>2</sub>

36%

1370 Mt CO<sub>2</sub>

22%



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Commercial registration no.: 47580

### THE ECRA TECHNOLOGY PAPERS 2022

State of the Art Cement Manufacturing

Current technologies and their future development

- 55 technologies, new and major updates
- 7 summaries and state-of-the-art perspectives
- CO<sub>2</sub> capture technologies with comparisons and new results from research and pilot tests
- technological readiness (TRL) perspective
- OPEX and CAPEX estimates 2030, 2050
- [ecra-online.org/technology-papers](https://ecra-online.org/technology-papers)

# Achieving net zero cement, concrete and construction

Contribution of different stages of the value chain – only by working together can we succeed

- Achieving a net zero cement and concrete sector requires efforts of the whole value chain, politics and society. The table on the right side shows the degree of contribution by different actors.
- While cement producers have a direct part in reducing CO<sub>2</sub> emissions at the kiln and offering clinker reduced cements, they need concrete producers and contractors to request these green products.
- To increase material efficiency in building structures and thus reduce the overall binder volume, it needs architects to shape a sustainable design.
- Politics need to provide for the required framework conditions, such as renewable energies or a CO<sub>2</sub> infrastructure.

Contribution to achieve net zero	Cement producer	Producer of concrete / concrete components	Contractors	Designers Architects	Building authorities	Clients	Politics/ Society
Efficiency in design and construction	O			X	O	O	O
Efficiency in concrete production	O	X	O	O	O	O	O
Savings in cement and binder	X	X	X	O	O	O	O
Savings in clinker production	X	O	O	O	O	O	O
Carbon Capture and utilization / storage (CCUS) incl. mineralisation and use of CO <sub>2</sub> in concrete production	X	X	O	O	O	O	X/O
De-carbonisation of electricity							X
CO <sub>2</sub> sink: recarbonation				O	X		X/O

X = Active / direct contribution

O = Indirect contribution: Procurement / Support / Acceptance

From roadmaps to implementation – a net zero industry is possible



- Various roadmaps at national, EU and global level identify the key levers for decarbonisation. They are all based on the so-called 5C approach, which looks at the entire value chain from clinker, cement and concrete to construction and (re)carbonation (= uptake of CO<sub>2</sub> in concrete structures).
- A significant share of the emissions from clinker and cement production can be reduced through conventional measures such as higher energy efficiency, alternative fuels and the efficient use of clinker in cement, cement in concrete and concrete in construction.
- However, the use of carbon capture, transport, storage and utilisation (CCS) is necessary to achieve climate neutrality, but it involves high costs and new infrastructure across Europe.
- Therefore, the cement industry is dependent on a regulatory framework that enables the deployment of CCUS and the build-up of transport and storage infrastructure in the 2030s.
- At the same time, decarbonisation requires collaboration along the cement and concrete value chain, making full use of process and product innovation. This also includes training and new skills in the construction industry.

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### **3. Future skills' requirements, training today and tomorrow & attractiveness of the sector**

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## **3.1 Defining the skills' concept of the study**

**vdz**

- problem-solving, analytical and innovation competences
- cross-process, systemic and strategic thinking
- teamworking and collaborative working
- communication skills

- Information and data literacy
- Communication and collaboration
- Digital content creation
- Safety
- Problem solving & innovation



## Interpersonal skills



## Professional skills



## Digital skills



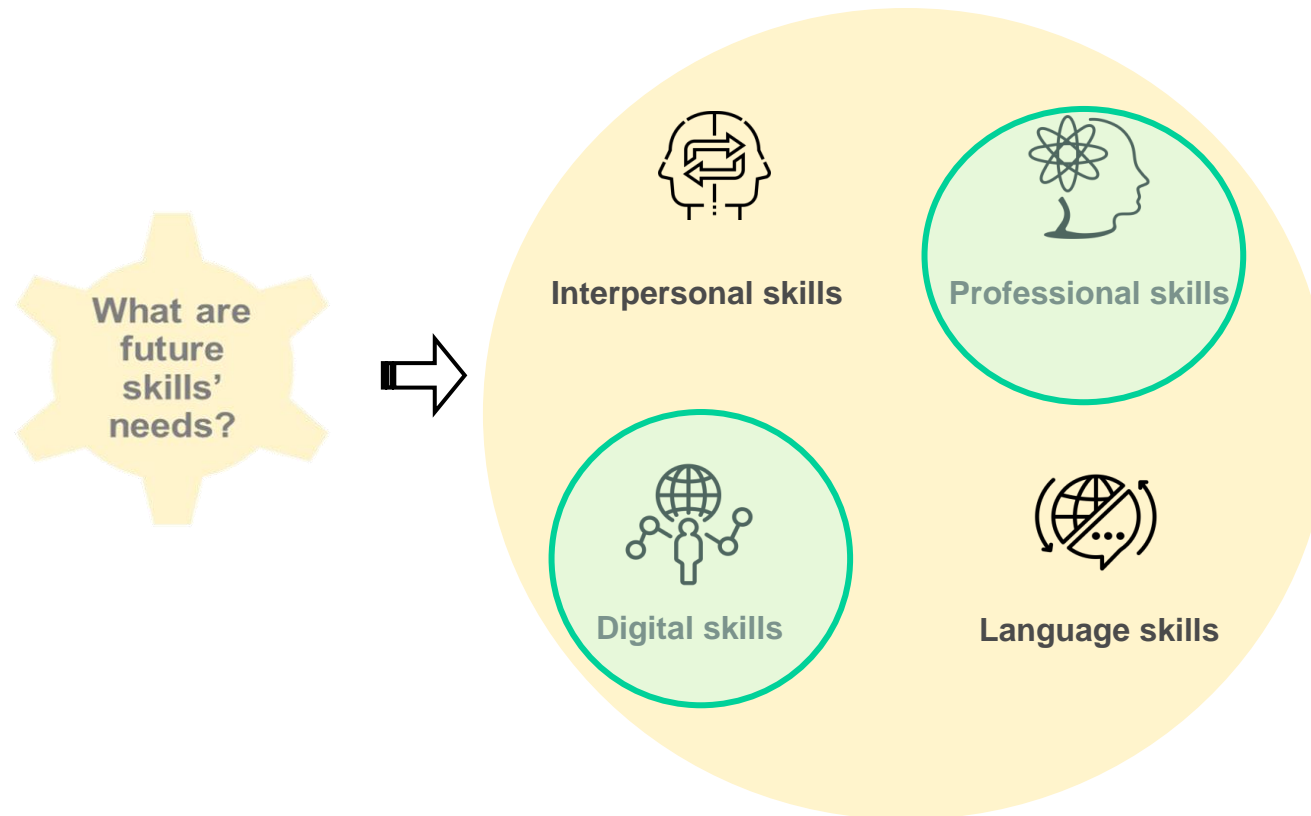
## Language skills

- New technologies (e.g. Oxyfuel Technology, use of hydrogen)
- CO<sub>2</sub> separation, storage & utilization technologies (e.g. scrubber)
- CO<sub>2</sub> infrastructure and transport-systems
- Thermal and mechanical engineering
- Chemical and physical properties of new materials
- Geosciences and biology
- Process optimization for energy efficiency in cement production
- Innovation and change management

- Key competence in the European framework of reference for lifelong learning
- Basis for successful learning of future technologies
- language skills lead to an increase in mobility

# Defining the skills' concept of the study

Matching the European Skills Agenda with the future skills' needs of the cement industry



## Focus on decarbonization and digital skills

- As decarbonization is the most crucial and challenging transformation process in the cement industry, the study design focuses specifically on an in-depth analysis of the professional skills requirements.
- In parallel, the development and implementation of innovative technologies in the industry will inevitably lead to an increase in new digital systems and programs. These technological advances are not only crucial for optimizing process control, but also play a key role in analyzing and managing the increasingly complex amounts of data generated in modern cement production. As a result, the development of new professional skills will be closely linked to the promotion and expansion of digital skills.
- Nevertheless, language and interpersonal skills will still become increasingly important.



## Professional Skills

### New technologies & products, infrastructures and materials

- New technologies (e.g. Oxyfuel Technology, use of hydrogen)
- CO<sub>2</sub> separation, utilization and storage (e.g. scrubber)
- CO<sub>2</sub> infrastructure and transport-systems
- Chemical and physical properties of new materials (e.g. circularity)
- Cement chemistry and material science
- Geoscience and biology
- Automation and control systems for efficient production
- Process optimization for energy efficiency in cement production

### Engineering & Project Management

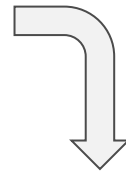
- Thermal and mechanical engineering
- Process optimization for energy efficiency in cement production
- Development of alternative, sustainable raw materials for cement production
- Innovation Management

### New regulatory EU requirements & international trade

- Environmental management, Environmental law & mitigation strategies
- Emission control, permitting
- Emissions trading, CBAM
- Monitoring, Reporting & Certification
- International trade & carbon leakage
- Circular economy & waste management
- EU Taxonomy, sustainability reporting
- Cross-sectoral negotiation skills



Source: European Reference Framework for Digital Competences (DigComp)



Adaption to the cement industry



## Digital Skills

### Information and data literacy

- Evaluation and assessment of data
- Information and digital content
- Organizing and managing data

### Communication and collaboration

- Interaction, communication and collaboration with the help of digital technologies

### Digital content creation

- Interaction, communication and collaboration with the help of digital technologies

### Safety

- Protection of personal data and privacy
- Awareness of the impact of digital technologies

### Problem solving

- Identifying technical problems and finding solutions
- Using digital tools to innovate processes and products
- Artificial intelligence
- Machine Learning

Classification used in the study

## **International Standard Classification of Occupations 2008 (ISCO-08)**

- A clear classification of occupational groups & professions in the cement industry is essential.
- The International Standard Classification of Occupations 2008 (ISCO-08) provides internationally comparable definitions and has been adopted for the study.
- The ISCO-08 is divided into 4 levels: major groups > sub-major groups > minor groups > unit groups.
- Four of the nine major groups were selected in which the work profiles of the cement industry corresponded the most (Major groups 1-3 and 8).
- The occupation classifications of individual countries may differ from ISCO-08. It will, however, ensure comparability of case studies and gives clear structure & definitions for the project.
- Of course, the use of ISCO-08 is not intended to replace any existing national classification of occupations.

# Occupational Groups of the Cement Industry acc. ISCO-08

	<b>Managers<sup>1</sup></b> Major group 1 acc. ISCO	<b>Professionals<sup>2</sup></b> Major group 2 acc. ISCO	<b>Technicians and Associate Professionals<sup>3</sup></b> Major group 3 acc. ISCO	<b>Plant and Machine operators and assemblers<sup>4</sup></b> Major group 8 acc. ISCO
<b>Job profiles Examples</b>	Plant Manager	Chemists and Chemical Engineer	Electrical Technician	Industrial Foreman and Process Controller
	Production Manager	Material Engineer	Engineering Technician	Plant and Machine Operators
	Operations Manager	Process Engineer	Maintenance Technician	Labourer in mining, construction, manufacturing, and transport
	Quality Manager	Environmental Engineer	Automation Technician	Cement, Stone and other product Machine Operators
	Administrative and Commercial Manager	Electrical Engineer	Laboratory Technician	Electrical and Electronic Trades Worker
	Communication Manager	Maintenance Engineer	...	Crafts and related trades Worker
	Human Resource Manager	...	...	Truck Driver, Loader and Excavator Operator
	Sales Manager	...	...	...
	Environmental Health and Safety Manager	...	...	...

<sup>[1]</sup> Second stage of tertiary education leading to an advanced research qualification (e.g. doctoral studies)

<sup>[2]</sup> Second stage of tertiary education leading to an advanced research qualification (e.g. masters degree)

<sup>[3]</sup> First stage of tertiary education, short or medium duration (e.g. bachelors degree)

<sup>[4]</sup> Post-secondary, non-tertiary education ("Industriemeister"- Industrial Foreman), upper secondary level of education ("Produktionssteuerer"- process controller), lower secondary level of education

# Concept of skills used in the study

## Skills requirements, education & training today and tomorrow

- As decarbonization is the most crucial and challenging transformation process in the cement industry, the study design focuses specifically on an in-depth analysis of the professional skills requirements.
- In parallel, the development and implementation of innovative technologies in the industry will inevitably lead to an increase in new digital systems and programs, which require new skills of the work force.
- Language and interpersonal skills will also become increasingly important. However, the study will focus exclusively on the professional and digital skills.
- A clear classification of occupations in the cement industry is essential. For the purpose of the study, the International Standard Classification of Occupations 2008 (ISCO-08) was used, which provides internationally comparable definitions.



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## **3.2 1<sup>st</sup> Workshop – Summary of results**

**vdz**

Brainstorming for Cement Skills by 2030-2050

Brussels, 7<sup>th</sup> – 8<sup>th</sup> March 2024

# Workshop „Brainstorming for Cement Skills by 2030-2050”

Impressions, objectives and participation



## Objectives

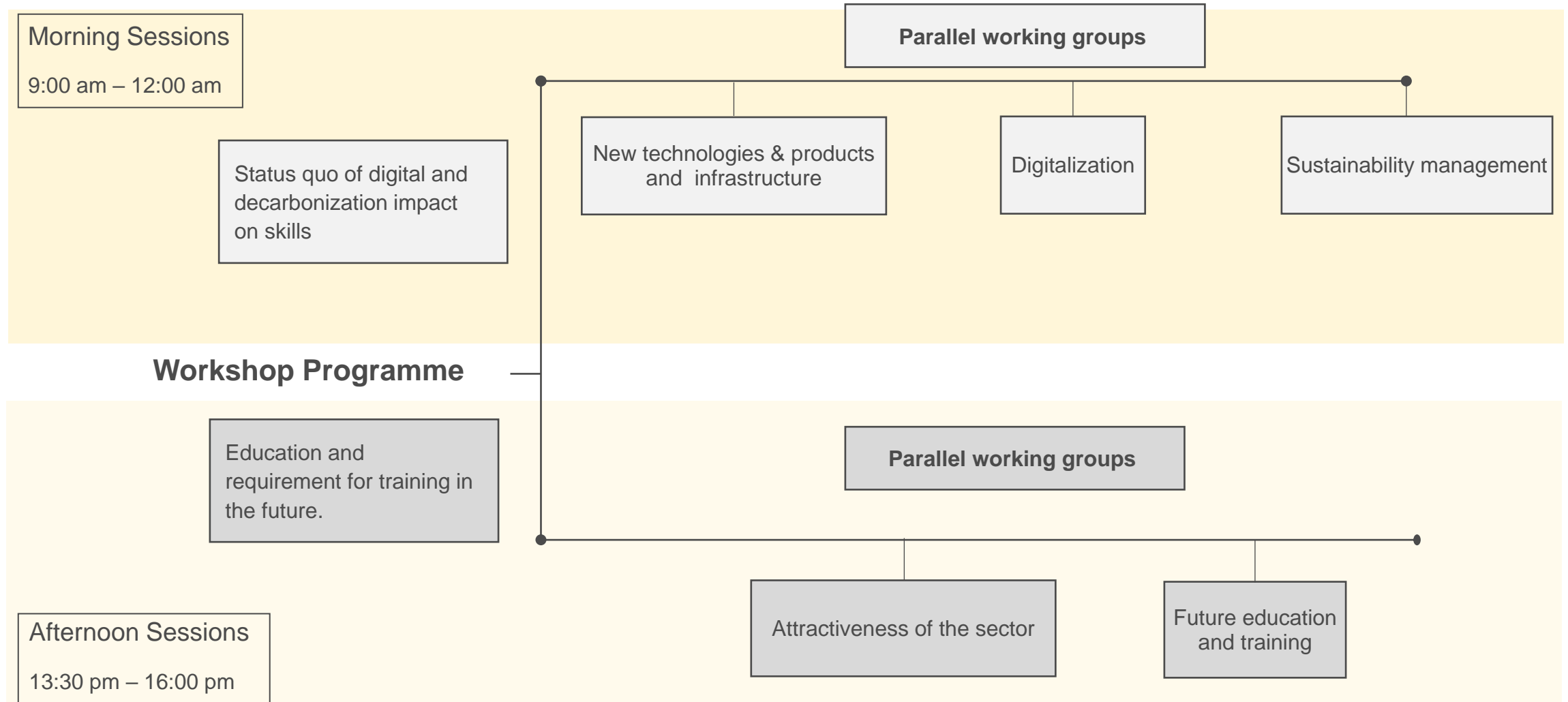
- Presentation of VDZ's desk research findings
- Brainstorming on the impact of transformation processes on the workforce of the cement industry
- Presentation and discussion of the draft questionnaire for the only survey

## Participation

- Approximately 30 participants from over 10 countries: representatives from EFBWW and CEMBUREAU as well as from their affiliate organisations and companies.
- High level of participation in all working group sessions and valuable results
- Positive feedback regarding the organisation and the topics discussed

# Workshop „Brainstorming for Cement Skills by 2030-2050”

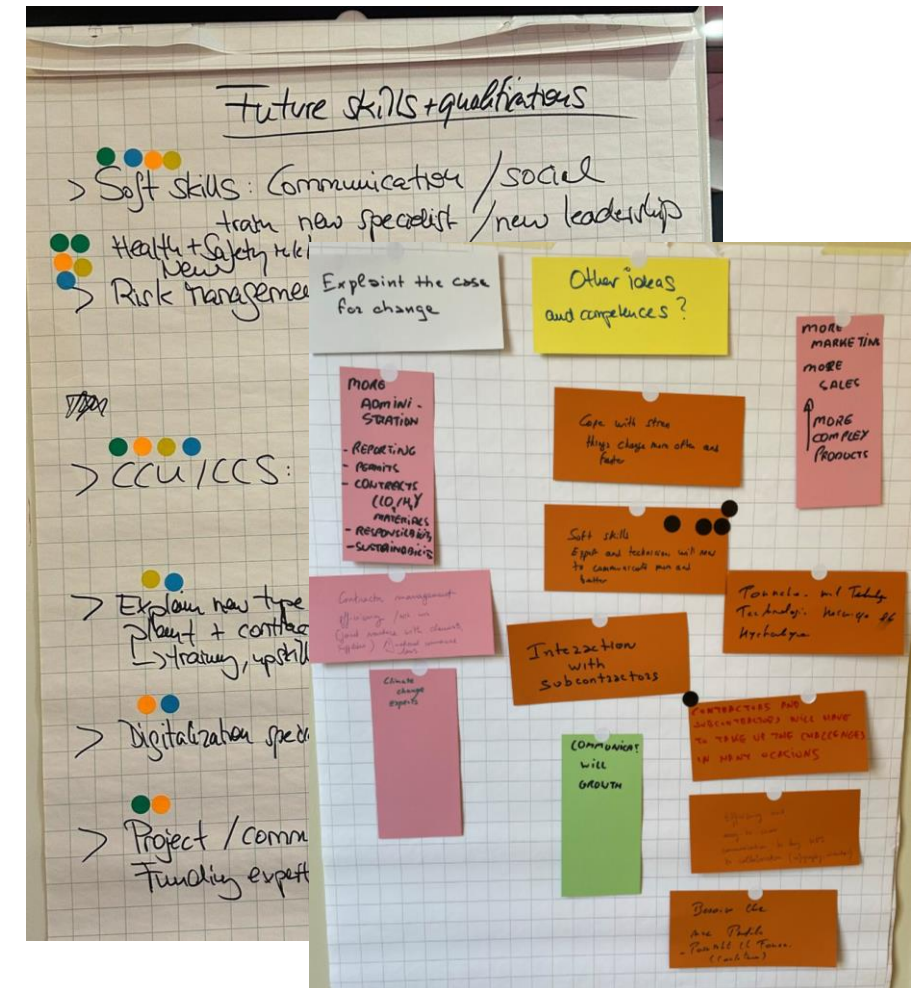
## Programme



# Workshop results „New technologies, products and infrastructure“

Which skills are required for the transformation of the cement sector? Who needs what?

- High demand for specialists in internal and external risk management, particularly for chemicals and new technology risks as well as automation experts and engineers
- Comprehensive training for new processes and regarding health and safety
- Project and communication managers will also become increasingly important for managing new investments and ensuring an effective communication



# Workshop results „Sustainability management“

Which skills are required for the transformation of the cement sector? Who needs what?

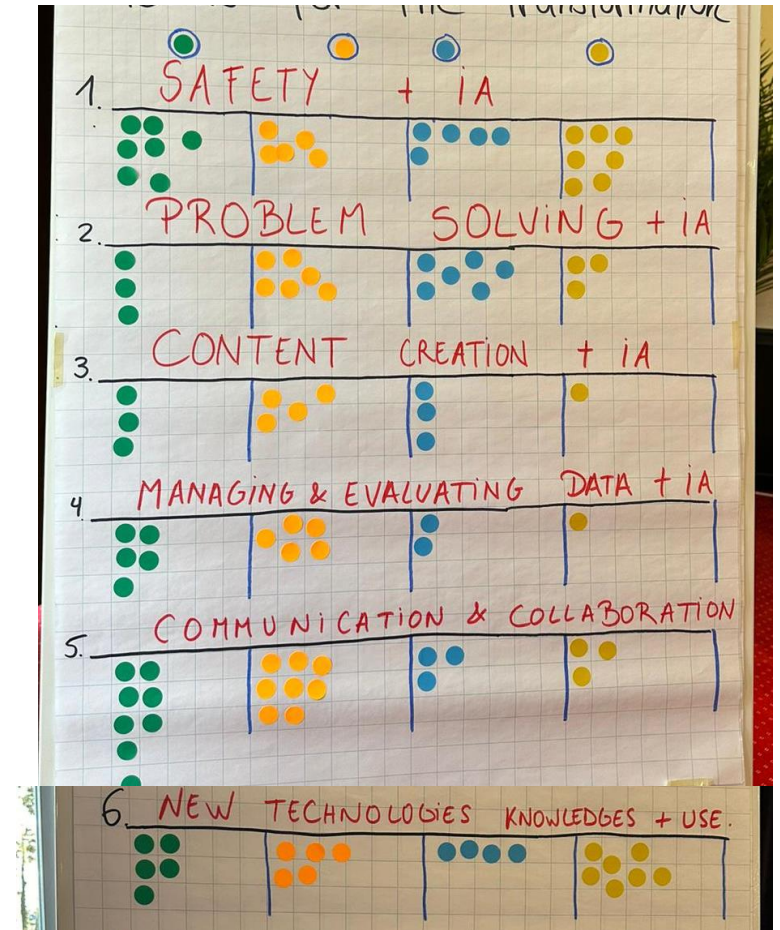
- Professionals needed in areas such as Finance, Legal, Chemistry, Environmental Engineering, Economics, Sustainability, Health & Safety and Communication.
- Proficiency in IT tools for reporting, in-depth chemical knowledge, environmental protection techniques, automation, and technical skills, alongside effective risk management strategies.
- For successful project implementation, attributes such as empathy, curiosity, adaptability, creativity, leadership and concern for the community were emphasised.
- Strong stakeholder involvement, effective communication at all levels and continuous professional development is required



# Workshop results „Digitalization“

Which skills are required for the digitalization of the cement sector? Who needs what?

- Essential digital skills for all occupational groups: Safety, communication and collaboration, new technologies knowledge and use
- Increasingly important is the integration of AI and knowledge about AI (including the identification of potential risks)
- There will also be a growing need for hands-on training in new technologies, security and AI-driven processes



# Workshop results „Future education and training“

What needs to be changed, adapted and developed in order to train the right skills ?

- First step: Evaluation of existing skills to map new requirements and identify knowledge gaps
- Support life long learning and develop opportunities for all employees: Strategies to boost motivation and engagement are essential
- Tailored training programmes need to be developed for different target groups
- Training formats and methods should follow a mixed approach, with an emphasis on hands-on, practical training methods to ensure successful transfer to day-to-day work



# Workshop results „Attractiveness of the sector“

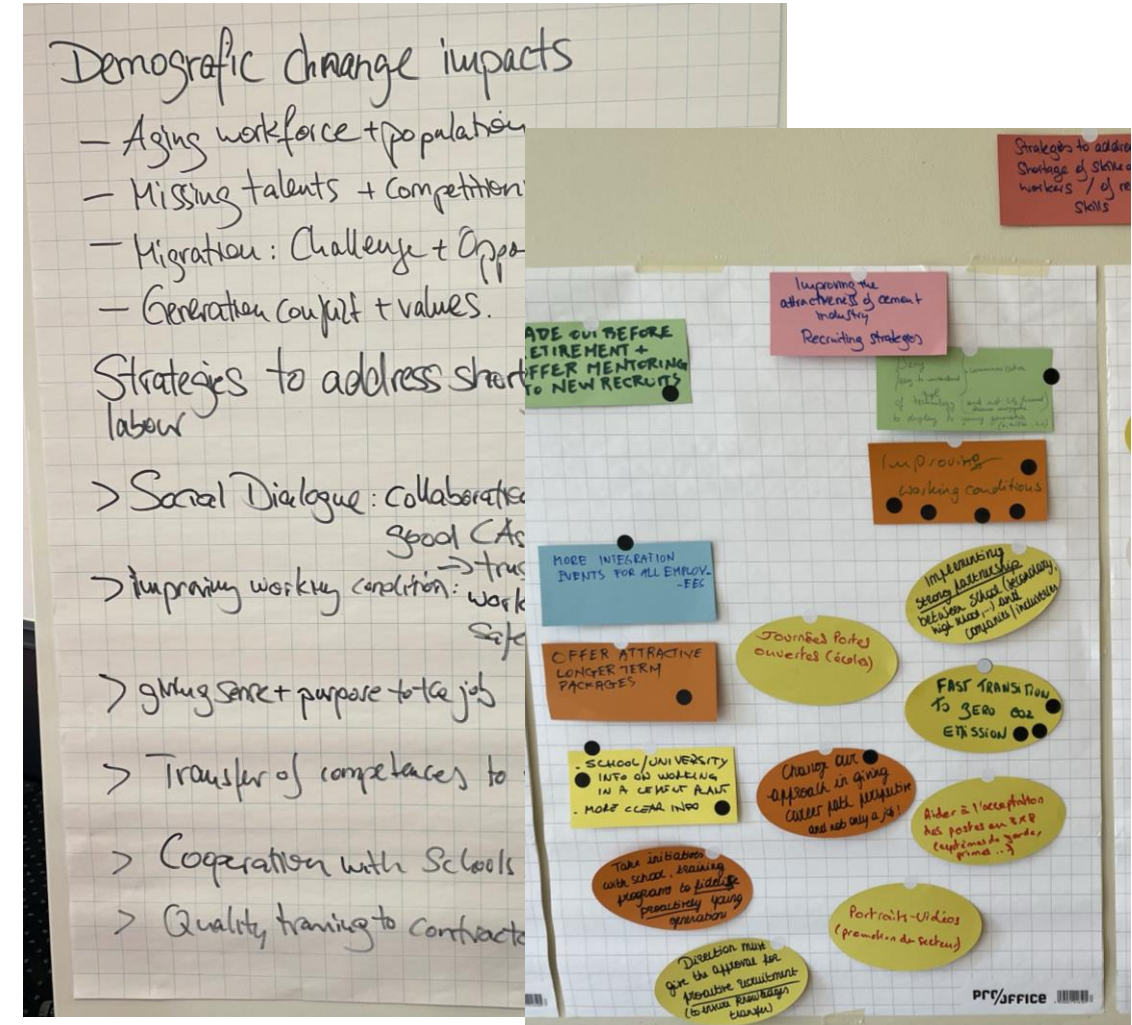
## Challenges of demographic change & Strategies to adress skilled labour shortages

### Challenges:

- Aging workforce & competition for talents
- Generational conflicts and cultural differences

### Strategies:

- Social Dialogue to foster collaboration at all levels
- Improvement of working conditions to make jobs in the cement sector more attractive
- Transfer of skills from experienced to new employees
- Educational cooperations and new training programmes, tailored to the needs of the cement industry



# Workshop results at a glance

## Summary of key findings

- High demand for specialists in risk management, automation, environmental technologies and communication, particularly in areas like chemicals and new technologies.
- Important soft skills such as empathy, adaptability, creativity, and leadership are crucial for successful project implementation and stakeholder engagement.
- Growing importance of AI and new technologies: Training on safety and AI-driven processes is essential across all occupational groups.
- Lifelong learning becomes increasingly important: Develop tailored, hands-on training programs for different target groups to ensure skills transfer.
- Enhancing sector attractiveness through social dialogue, improved working conditions, and intergenerational collaboration.
- Addressing demographic challenges to tackle skilled labor shortages through educational cooperation and industry-specific training programs.



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## **3.2 Online Survey – Analysis of survey results**

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## Methodological Considerations

- **Data Collection period:** 31 working days (from June 19<sup>th</sup> to July 31<sup>st</sup> 2024)
- **Data Collection method:** Online survey (created using the LamaPoll tool), distributed to participants by CEMBUREAU and EFBWW. The questionnaires were translated and sent out in six languages (English, French, Polish, Spanish, Greek, German).
- **Question types:** Primarily multiple-choice questions, supplemented by partially open-ended questions and ranking questions.
- **Sample:** Analysis is based on 97 fully completed questionnaires; 118 participants dropped out, mostly after the demographic questions.
- **Data analysis:** Descriptive method to highlight basic patterns and trends.
- **Representativeness:** The results of the survey are only partially generalisable due to their limited representativeness. Sample composition and the voluntary nature of participation limit the transferability of the results to the whole industry. The results should therefore be interpreted as indicators of possible trends and not as final conclusions.
- **Personal interviews:** Conducted to validate the case studies.

1. From which of the following countries are you taking part in the survey?

Please indicate:

☐ Germany

☐ France

☐ Belgium

☐ Greece

☐ Poland

☐ Spain

☐ If none of the above, please state your country



9. Which training formats does your organisation use?

Please add other training formats if necessary and select the **three** most important ones.

☐ Blended learning (combination of online and in-person training)

☐ E-learning courses / online modules

☐ On-the-job training

☐ Mentorship programmes

☐ External in-person training courses

☐ Other, please specify

## Overview

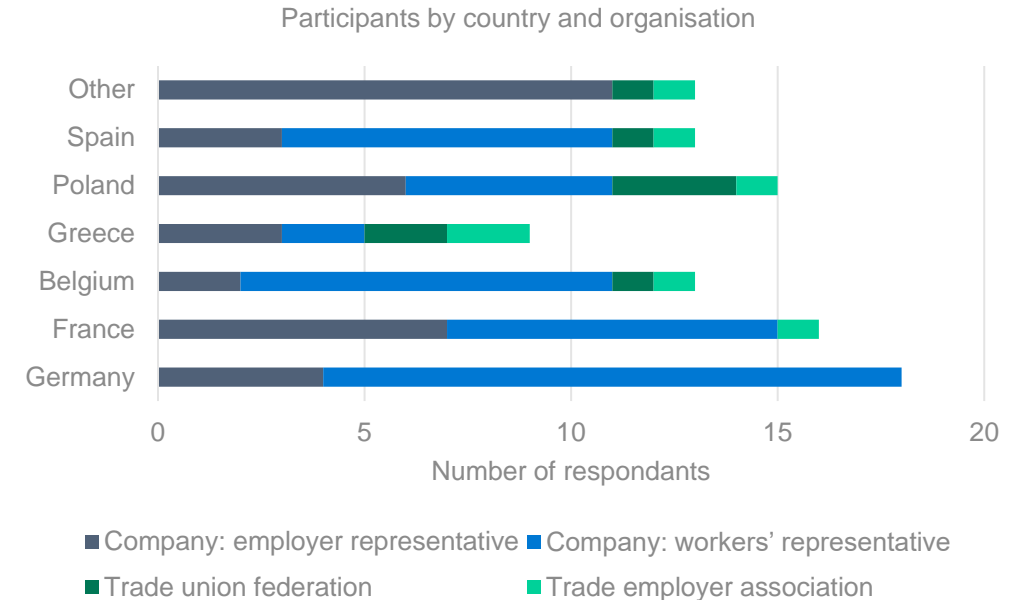
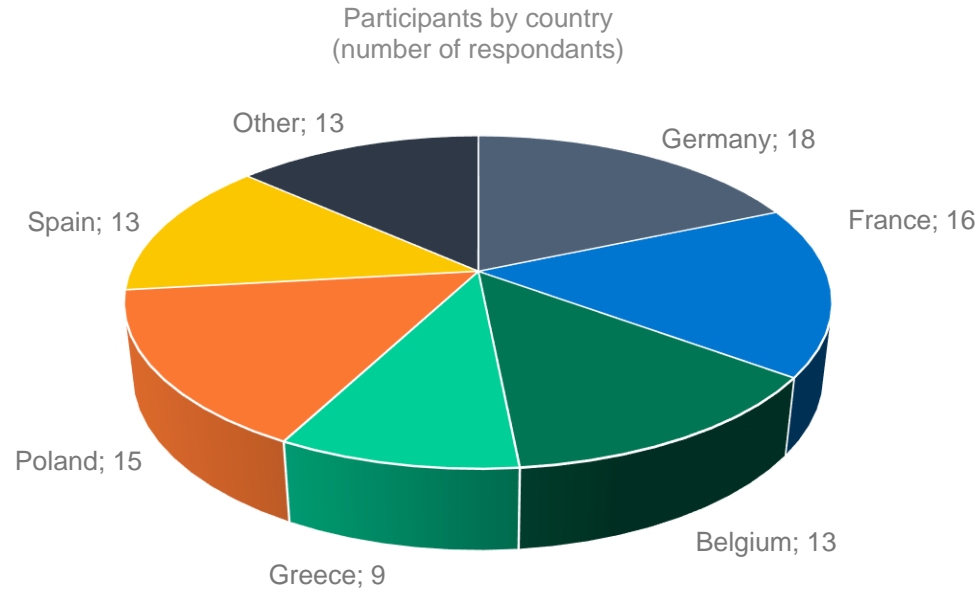
Demographics	Status quo	Future skills' requirements	Future education & training	Case studies
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# Participation by country and type of organisation

Good coverage of the case study countries and beyond



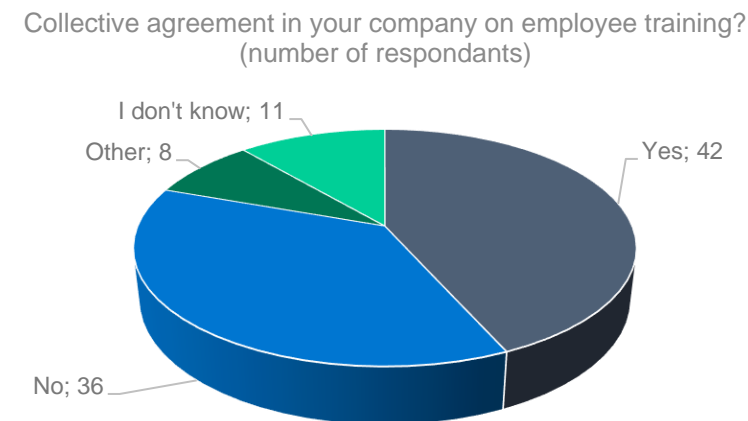
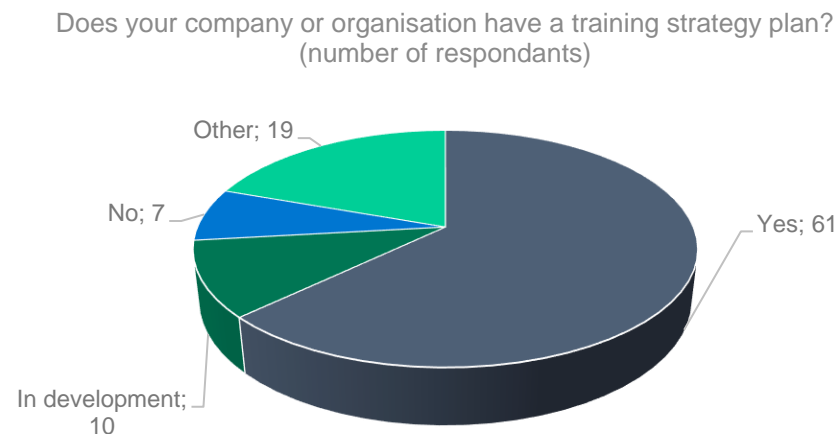
- All six case study countries with good level of participation from target groups (\*Germany: only company level responses)
- Slightly more responses from workers' representatives and trade unions (54 out of 97 completed questionnaires)
- 85% of responses from company representatives (workers + employers side)
- Managers, professionals, technicians and associate professionals with 65% share of total responses
- Comparably low participation of plant & machine operators

Note: other countries with respondents = Bulgaria, Croatia, Czech Republic, Austria, Estonia, Latvia, Luxembourg, Portugal and Italy

## Overview

Demographics	Status quo	Future skills' requirements	Future education & training	Case studies
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## Majority of companies with training strategies in place



- Two-thirds of participants report of training strategies in place on company level with a small proportion currently developing such a strategy. Only 20% of the responses mention no specific training plan.
- Very similar distribution of answers across case study countries.
- Collective agreements on employee training appear to have a very different status in the various countries. France, Belgium and Greece in particular rely more heavily on this instrument.
- Other dedicated agreements on training between companies and other institutions seem to exist in all countries to some extent, showing a particular importance in Spain.
- Public financial support for training seems to be the exception rather than the rule.
- Individual training programmes are mainly determined by HR departments with no or limited participation of works councils or employee. This general view is shared in all countries covered.

Participation in training programmes partly differ by occupational or age groups



**Ranking of reasons for  
varying training participation**

(1) Training needs

(2) Employee's motivation for training

(3) Time for training

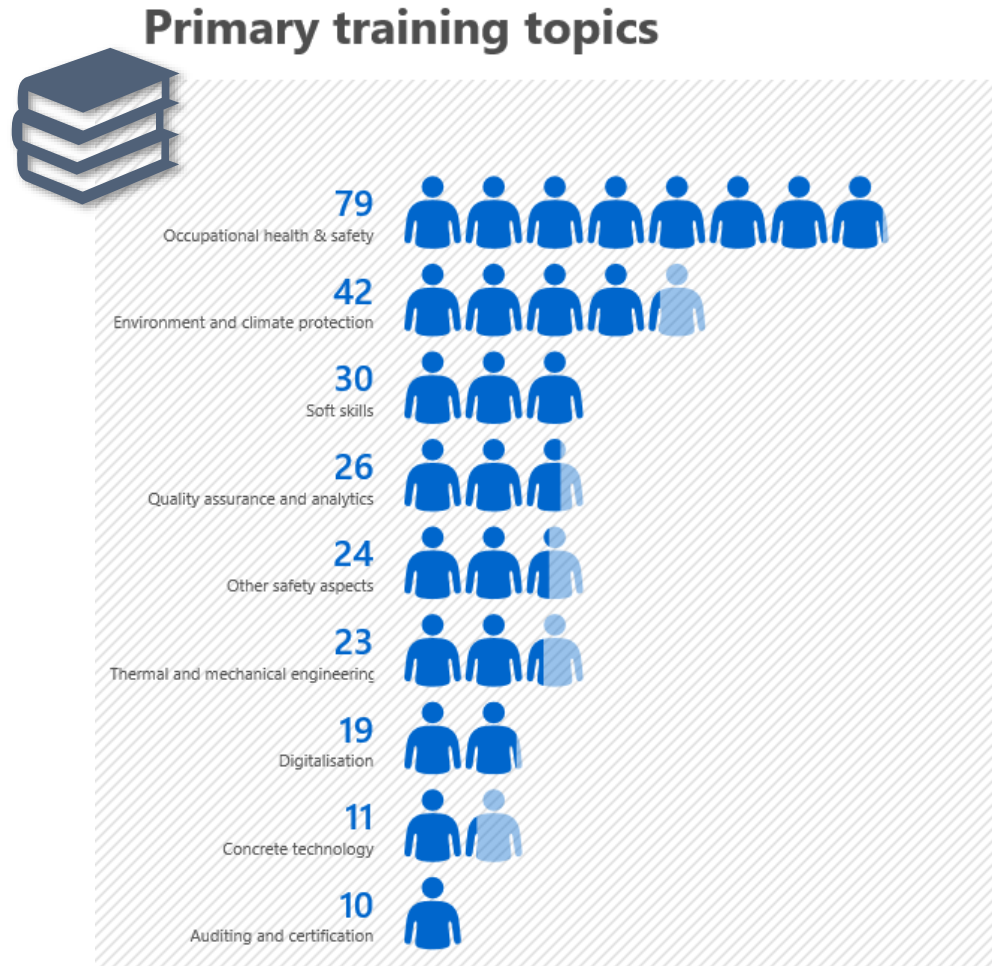
(4) Cost of training

(5) No suitable training offers

- Almost 50% reported that there are differences in training participation between occupational or age groups; around 8% did not know.
- Some variations across countries. While for Poland more than half of the participants reported differences in training participation by occupational or age groups, in countries such as Belgium or Greece these variations seem not to occur that often.
- Slight differences in the rankings of reasons between participating countries. While in Germany „Cost of training“ ranks first, the „Time for training“ is most important in France. „Employees motivation for training“ overall ranked second, but less relevant in Belgium and France.

# Training topics – status quo

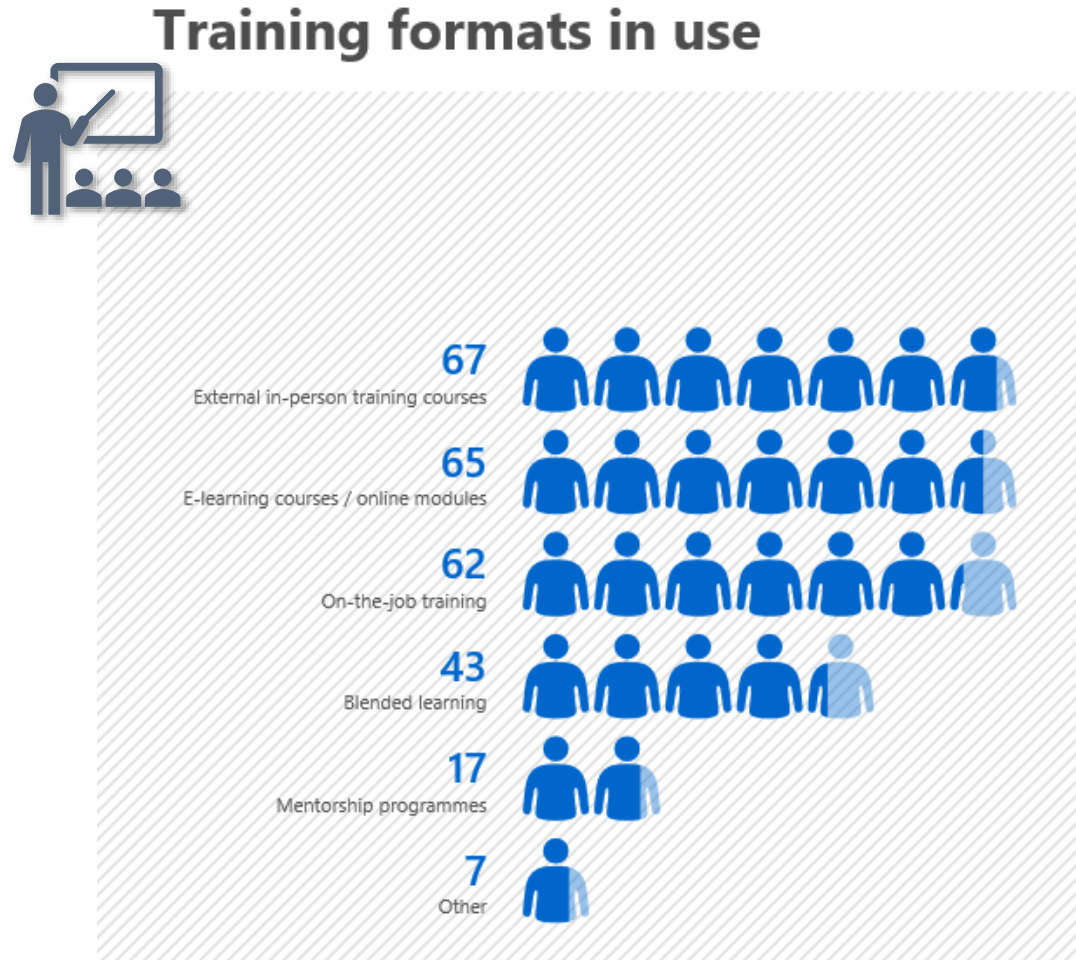
Health & Safety on top in all countries, higher variation among other topics



- Occupational health & safety is ranked as the top priority across all countries\*, requiring continuous updates to address evolving technologies and materials in the cement industry.
- Many companies are already incorporating environmental and climate protection into their training programs, demonstrating that these issues are high on the agenda.
- Soft skills rank as the second-highest priority in Belgium and Greece. Their importance is growing, particularly for adapting to change, with an emphasis on leadership, conflict resolution, and change management to improve employee retention, motivation, and overall productivity.
- Process engineering topics play a subordinate role, suggesting that knowledge in these areas is already well-established and the industry's focus is increasingly shifting towards transformational processes such as digitalization and decarbonization.

# Training formats – status quo

Similar preferences in all countries, in-person training courses & e-learning dominate



- External in-person training courses and e-learning courses are the most commonly used training formats, offering a flexible blend of traditional methods and digital learning that allows learning to take place anywhere and at any time. This combination is preferred in the cement industry to accommodate different learning preferences and to meet the specific skill needs of employees.
- Hands-on, on-the-job training is also essential, as it enables immediate integration of new knowledge into daily work routines and processes

# Training materials and programmes

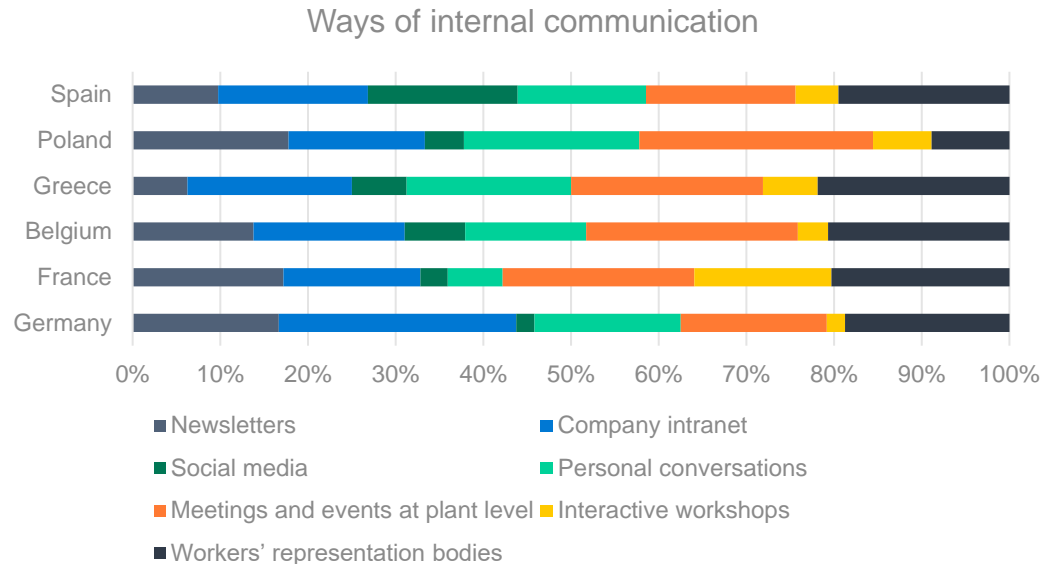
Most participants were satisfied with the offered material and provided recommendations



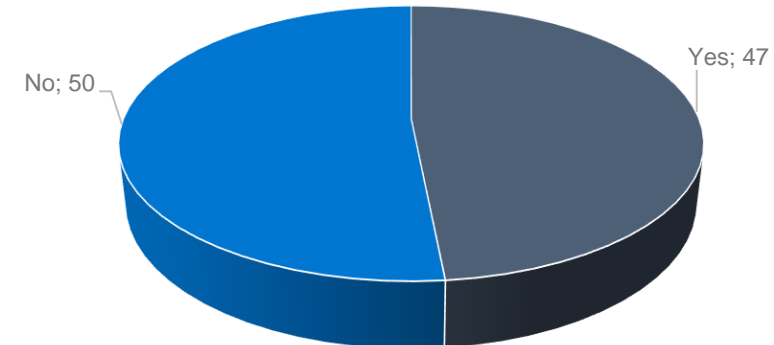
- Two-thirds of the participants reported that they are satisfied with the offered training material and programmes, of which around 40% still see room for improvement.
- Roughly 30% of respondents were not satisfied.
- Most frequently mentioned suggestions for improving material or training programmes
  - Tailored training
  - New training topics
  - Modernization of training methods
  - Practical on-the-job-training
  - Support from management / trainers
  - Language / translation

# Ways of internal communication

## Personal interaction most relevant to communicate about changes and new technologies



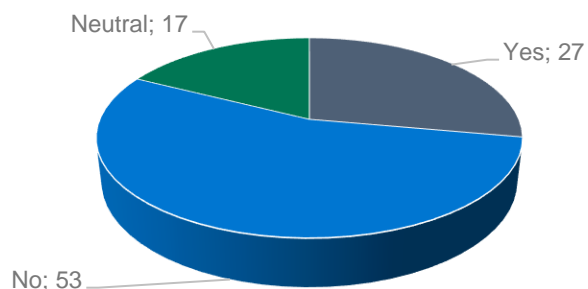
As part of your internal communication, do you specifically address health & safety concerns arising from the deployment of new technologies at plant level? (amount of respondents)



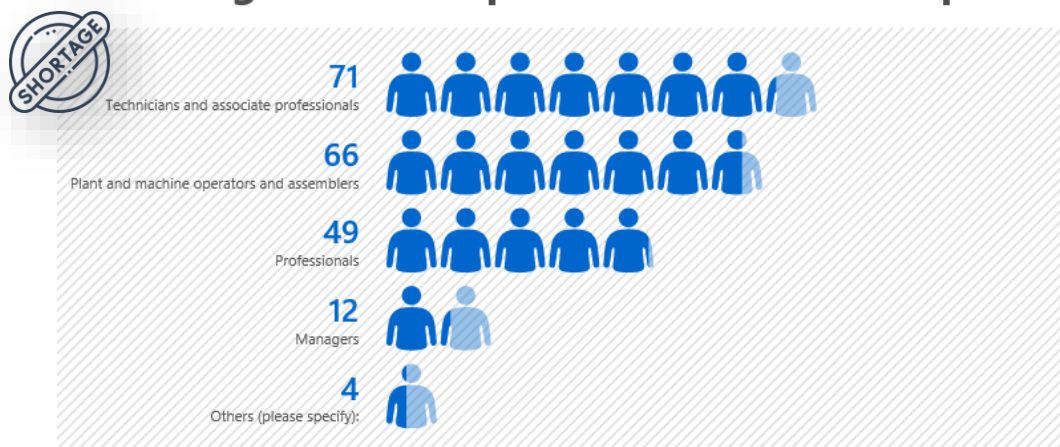
- Meetings and events at plant level with highest overall score, followed by company intranet.
- In France, Greece and Spain workers' representation bodies are the most important way to inform workers. While in Spain social media play a certain role, it is of rather low importance in the other countries.
- Less than half of the respondents (47 out of 97) reported that internal communication addresses health and safety issues arising from the use of new technologies at the plant level. Examples include training programs, workshops, (online) briefings or newsletters. However, in the majority of cases health and safety issues are not yet specifically addressed.

## Cement industry confronted with a lack of technicians – worsening situation expected

Is the cement industry an attractive sector to work in?  
(amount of respondents)



### Shortage of skilled professionals - Status quo



- The cement industry has a rather negative image as a place to work in. Nevertheless such perception is dynamic, i.e. participants reported that the image is undergoing either a positive or a negative change (20% each).
- Positive image change is mostly linked to decarbonisation. Arguments for the negative image is among other high CO<sub>2</sub> emissions, pollution or a general unattractiveness of heavy industries. Overall, the image of the cement sector seems to be quite different from country to country.
- Facing this negative perception it is challenging to attract skilled professionals.
- High demand for technicians and associate professionals as well as plant and machine operators and assemblers. The lack of professionals (such as natural scientists or electrical and civil engineers) ranks on third position.
- Over the next ten years this shortage is expected to worsen, specifically with regard to technicians and plant / machine operators.

Note: People graph = question with multiple selection, figures represent amount of responses for each category

# Online Survey results at a glance

## Status quo analysis: Summary of key findings

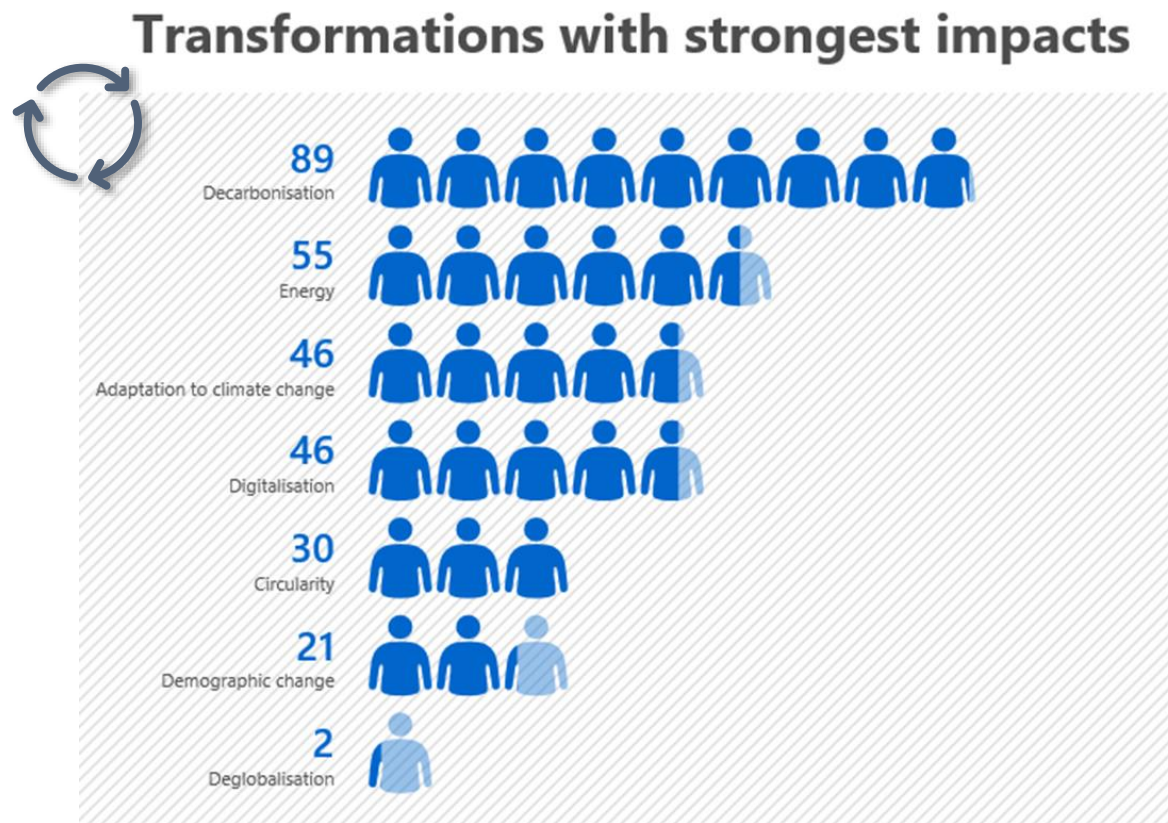


- Majority of companies with training strategy in place or in development, 20% mention no specific plan.
- Collective agreements between the social partners on employee training with different status across countries. Individual training programmes at company level are mainly determined by HR departments.
- Participation in training programmes varies for the following reasons: 1) training needs; 2) employee motivation; 3) time for training; 4) cost of training; 5) no suitable offers. The level of participation in training also appears to vary partly by occupation or age group.
- Training topics today dominated by health & safety in all countries, higher variation among other topics, i.e. environment & climate protection, soft skills, quality assurance & analytics.
- External in-person training courses and e-learning are the most commonly used training formats. Most participants were satisfied with the training materials provided, but still room for improvement.
- Personal interaction is the most important form of internal communication about changes, new technologies and associated health & safety topics.
- The cement industry has a rather negative image as a place to work. However, this perception is dynamic, i.e. the image is changing either positively (decarbonization) or negatively.
- Shortage of skilled labour already today, especially technicians, associate professionals & machine operators - negative trend expected in coming years.

## Overview

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Decarbonisation as the most pressing issue, but the industry also faces other transformations

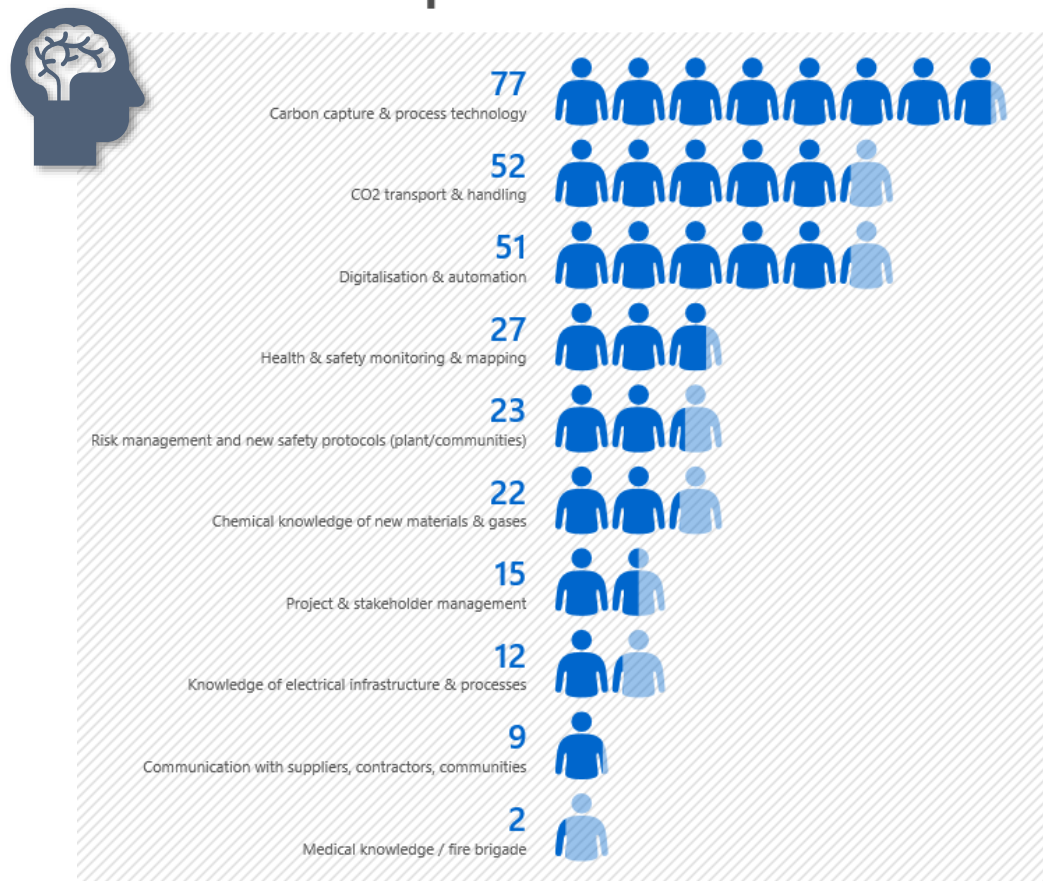


- Decarbonization with highest score in all countries.
- Germany, Greece and Spain rank digitalization as the second highest priority.
- Both, decarbonization and digitalization, are advancing together as a "double transformation," creating synergies that significantly enhance energy efficiency, for example, through the use of digital systems.
- France, Belgium, and Poland consider "Energy" the second most significant transformation, as the adoption of renewable energy and energy-efficient technologies is essential for reducing CO<sub>2</sub> emissions while also achieving cost savings.
- Big differences in the assessment of demographic change: High scores in Germany and Poland, low scores in especially in Spain and Greece.

# Future professional skills requirements for the transformations

Carbon capture, transport, handling and digitalisation will become most relevant skills

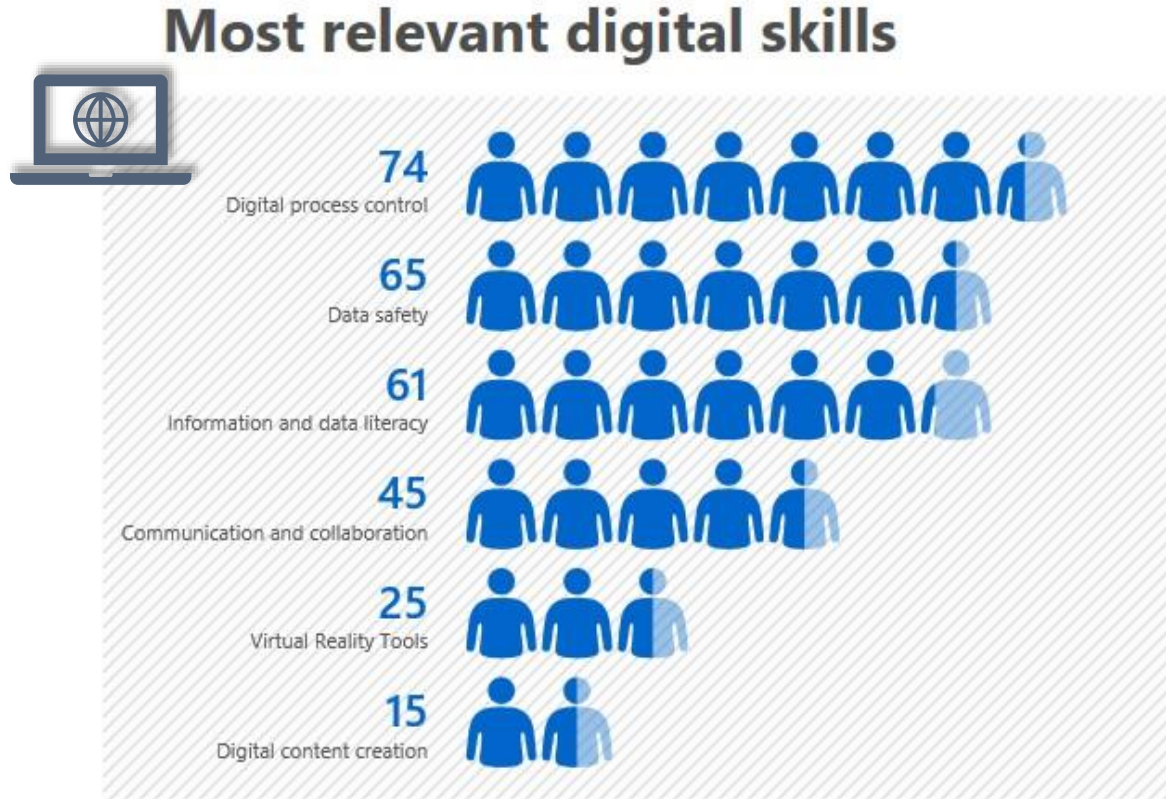
## Most relevant professional skills



- Decarbonization is identified as the top priority and the most challenging transformation topic, aligning with the evaluation of professional skills requirements
- Strengthening technical knowledge is essential to meet decarbonization objectives: "Carbon capture & process technology" is ranked as the highest overall priority
- In all countries, the second-highest priority is either "CO<sub>2</sub> transport & handling" (France, Belgium, Poland and Spain) or "Digitalization and Automation" (Germany and Greece)

# Future digital skills requirements for the transformations

Digital process control, data safety and literacy as most pressing qualifications



- Digitalization and decarbonization are advancing simultaneously, forming a “double transformation.” This creates synergy effects, so that, for example, energy efficiency can be significantly improved through the use of digital systems and models.
- In Germany, France, Greece, and Spain, the topics of “Digital Process Control” and “Data Safety” are the top two priorities
- Belgium places a strong emphasis on skills in “Communication and Collaboration” as a top priority, while France prioritizes skills in “Information and Data Literacy.”

# Future compliance skills requirements for the transformations

Emissions trading, circular economy and sustainability monitoring require most attention.



- Emission trading and emission control, circular economy & waste management as well as sustainability monitoring rank highest overall.
- Emission trading & control with highest priority in Germany and Poland, whereas circular economy & waste management skills considered most important in France, Greece and Spain.
- Occupational safety skills continues to have high relevance across all countries, plant safety and safety of communities with rather low scores, except for France.
- Soft skills related to the transformations such as stakeholder management seen as relevant but overall ranking low, except for Greece.
- Competitiveness and trading as well as environmental law skills with medium relevance.

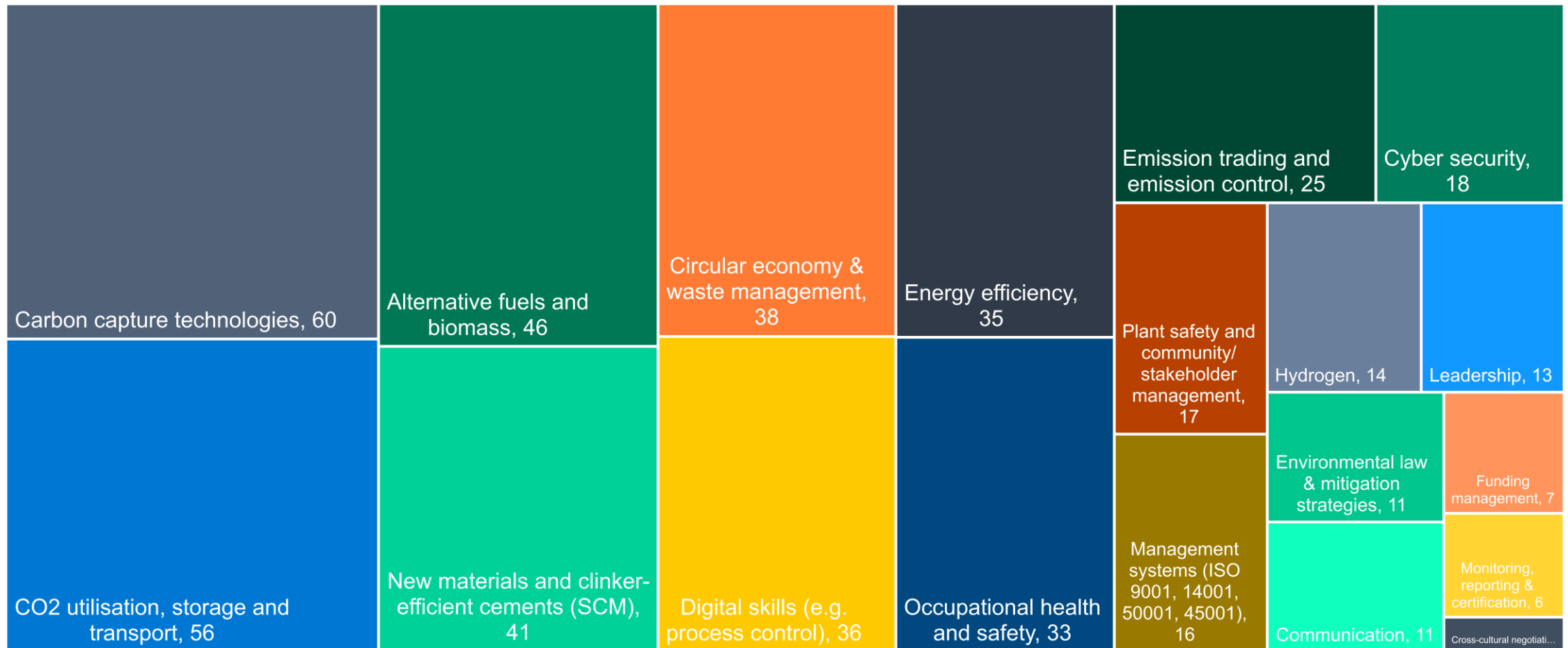
Note: People graph = question with multiple selection, figures represent amount of responses for each category

## Overview

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# Prioritised topics in the future to adapt training programmes

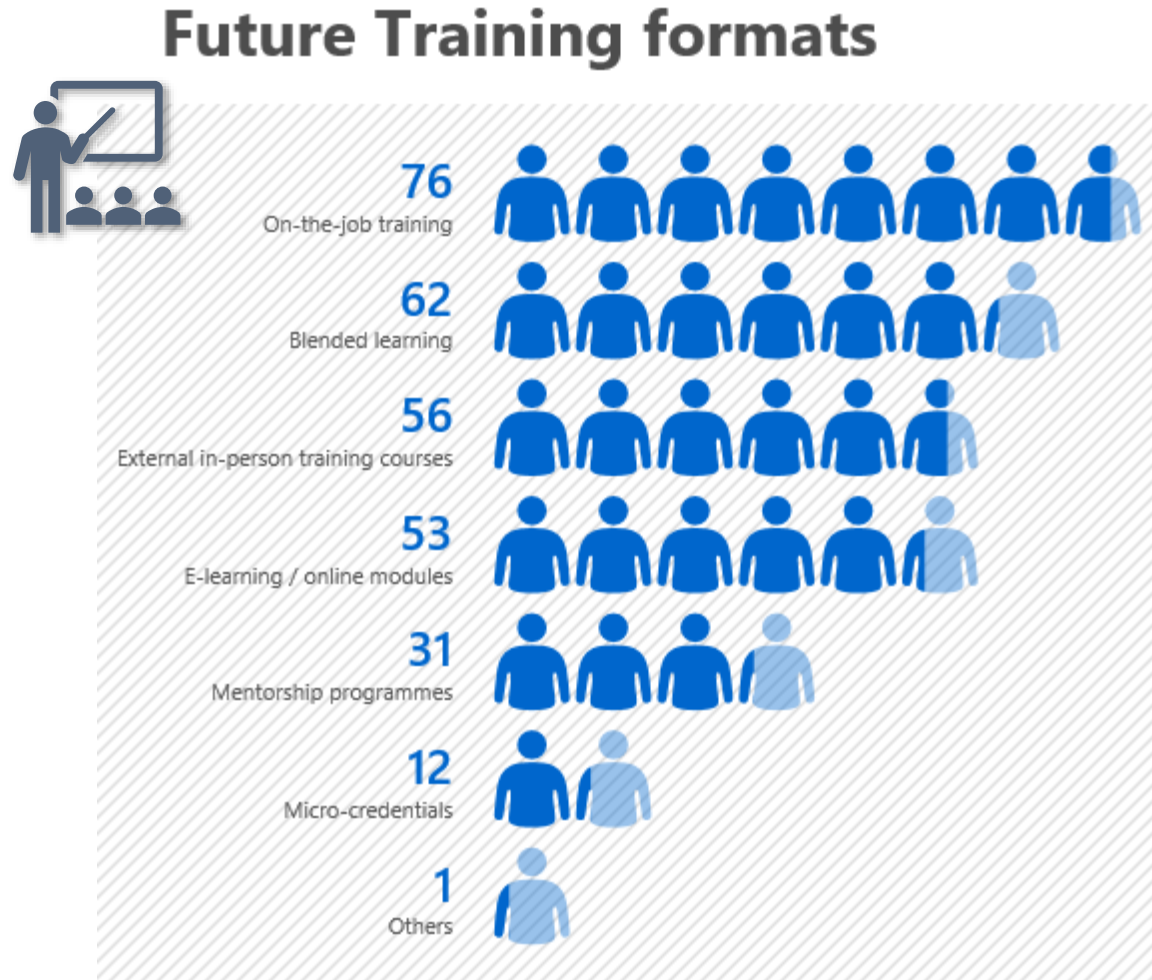
Decarbonisation, digitalisation and circular economy on top of „wishlist“



Note: questions with multiple selection; figures in boxes show how many participants selected this option, the bigger the box the more important the topic

# Training formats – priorities for the future

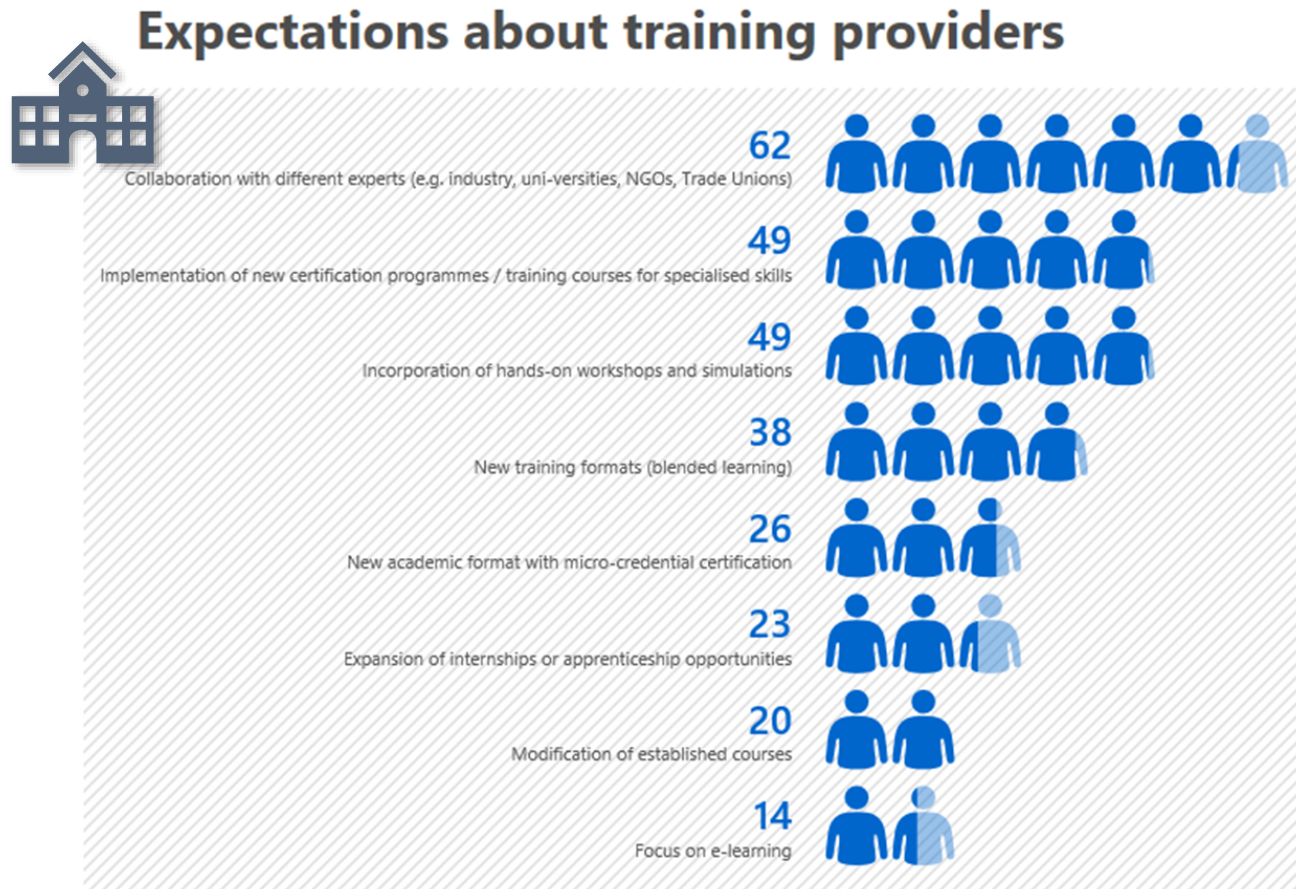
On-the-job and blended learning considered most promising concepts



Recommendations for action based on the participants' responses:

- On-the-job training is a key tool for imparting practical knowledge about technologies & products and for passing on experience to younger employees.
- Expand blended learning programs by integrating e-learning with in-person training, using digital tools for basic theoretical knowledge and in-person sessions for practical, hands-on tasks and complex skills.
- Invest in internal trainers and mentors by establishing a structured mentoring program that trains experienced employees to share their knowledge, provide effective feedback, and guide new employees in their skill development.
- Highlight the benefits of training by clearly linking it to career growth and development opportunities.
- Implement skills management programs to track progress, and providing regular feedback to ensure employees feel recognized, valued, and motivated in their learning journey.

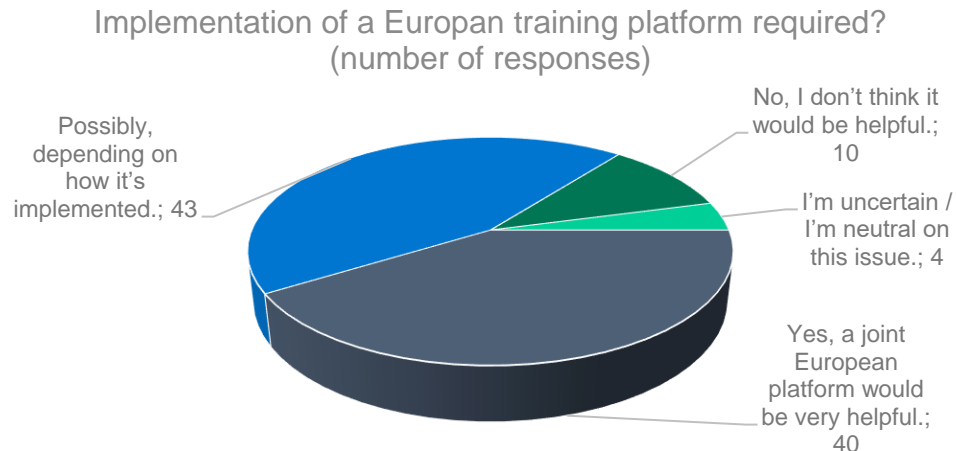
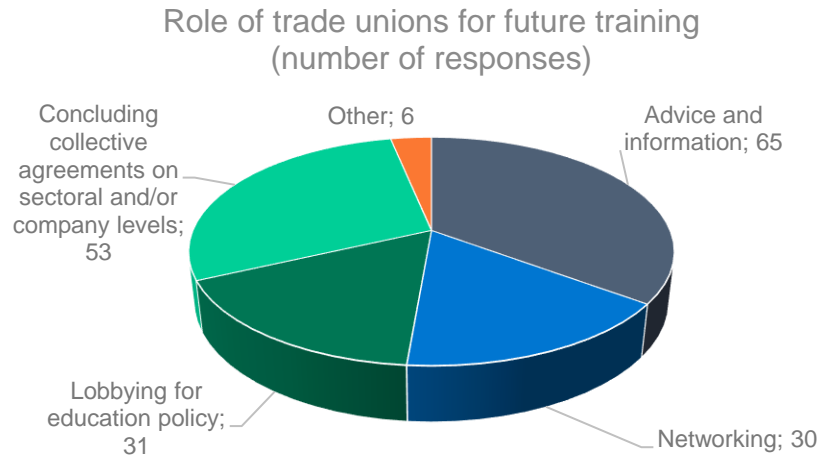
Training providers are expected to offer collaboration, hands-on workshops, and flexible learning formats.



- Expand collaborations with external experts and institutions, including industry, universities, NGOs, and trade unions, to ensure continuous knowledge exchange. This approach brings diverse perspectives on sustainability, digitalization, and labor challenges.
- Implement new certification programs for specialized skills, focusing on areas like CO<sub>2</sub> reduction, circular economy, and new technologies.
- Use qualified trainers to ensure practical knowledge transfer, enabling employees to apply new skills effectively in their daily work.

# Role of trade unions and joint platforms in future training

Union's expected to provide advice & information, collective agreements & partnerships



- The most widely recognized role for trade unions is providing advice and information with regards to training demands and skills development – specifically in Poland and Spain.
- Another relevant role is developing collective agreements at the sectoral or company level as well as partnerships with educational institutions to facilitate lifelong learning as well as lobbying for education policy changes – especially in France and Spain.
- To a certain extent, involvement in companies' education strategies is also viewed as relevant, particularly in countries like Belgium and Greece.
- Most participants believe that a European training platform would be beneficial in providing the necessary tools and courses for a successful transition for the sector (e.g. by sharing of good practices, providing information in different languages)

## Future skills' and training requirements: Summary of key findings



- Carbon capture, transport, handling and digitalisation will become most relevant professional skills.
- Digital process control, data safety and literacy as most pressing digital skills.
- Emissions trading, circular economy and sustainability monitoring as key compliance skills.
- Priority topics for future training programmes are decarbonisation technologies, new SCMs, alternative fuels & biomass, and circularity & digitalisation. Emerging issues such as cyber security, plant safety and stakeholder management with lower ratings but increasing relevance.
- On-the-job and blended learning are seen as the most promising training approaches for the future, with specific recommendations: expand blended learning programs by integrating e-learning with in-person training
  - invest in internal trainers and mentors by establishing a structured mentoring program
  - Highlight the benefits of training by clearly linking it to career growth and development opportunities.
  - Implement skills management programs to track progress and provide feedback.
- Training providers are expected to offer collaboration, hands-on workshops, and flexible learning formats.
- Trade unions expected to provide advice & information, collective agreements & partnerships in training.

Evolving the well-established

## 3.3 Case Studies

- Belgium
- France
- Germany
- Greece
- Poland
- Spain

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# Case studies Europe

An overview of six countries / key figures 2022

Country	Plants	Production (Mt)	Capacity (Mt)	Employees (2021)
Belgium	8	8.5	8.7	2,600
France	43	16.5	29.6	7,300
Germany	53	32.9	47.0	8,000*
Greece	7	6.8	12.7	1,468
Poland	11	18.5	23.5	8,500
Spain	32	18.4	42.5	5,400



# Case study Belgium



Based on social data input from companies and national associations (not part of online questionnaire)

- Four responses from three companies and one association
- Belgium cement industry with predominantly large companies
- Age structure of employees vary from company to company
- The concept of apprenticeship varies from region to region
  - public/private concepts in Brussels and Wallonia
  - public concepts for Wallonia, Flanders, Brussels and German speaking region
- Share of apprentices among total employees below 5%
- Types of employer-sponsored apprenticeships: Industrial mechanic, process mechanic, electronics technician, chemical laboratory technician, industrial clerk
- Training hours per employee differ from company to company – from 10 - 20 hours to more than 40 hours per year

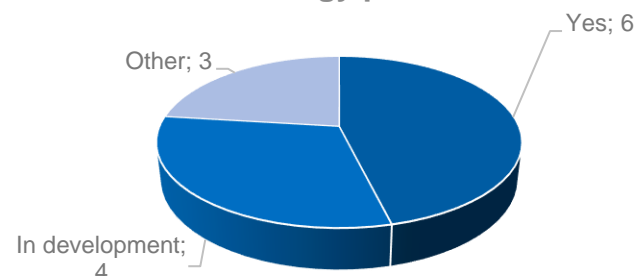
Concepts of apprenticeships		
Region	Public/private	Public
Brussels	<a href="https://www.efp.be/">efp https://www.efp.be/</a>	Actiris.brussels <a href="https://www.actiris.brussels/fr/citoyens/">https://www.actiris.brussels/fr/citoyens/</a> & Bruxelles Formation <a href="https://www.bruxellesformation.brussels/">https://www.bruxellesformation.brussels/</a>
Wallonia	IFAPME <a href="https://www.ifapme.be/">https://www.ifapme.be/</a>	FOREM = Public Service for Employment and Vocational Training in Wallonia <a href="https://www.leforem.be/">https://www.leforem.be/</a>
Flanders		VDAB <a href="https://www.vdab.be/">https://www.vdab.be/</a>
German speaking region		Arbeitsamt der deutschsprachigen Gemeinschaft Belgiens <a href="https://adg.be/">https://adg.be/</a>

# Cement Skills in Belgium / status quo analysis

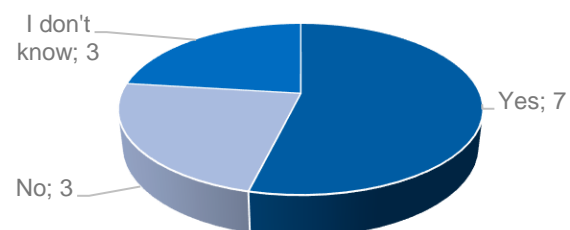


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Company with training strategy plan?



Company with collective agreement on employee training?



Ranking of reasons for varying training participation



Training needs

Time for training

Cost of training

TOP 5 Training topics

Occupational health & safety (11)

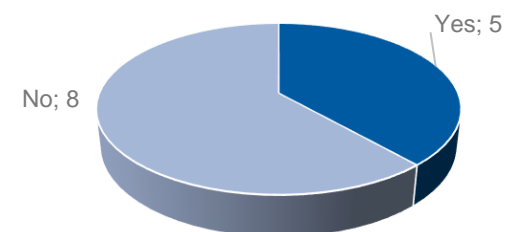
Soft Skills (5)

Environment and climate protection (4)

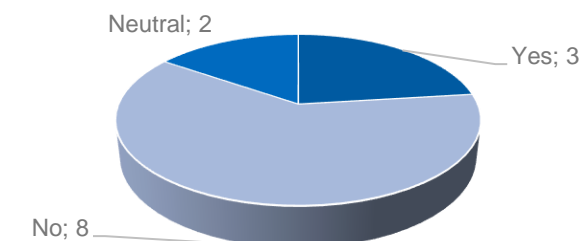
Other safety aspects (4)

Digitalisation (3)

Communication of health & safety concerns of new technologies?



Is the cement industry an attractive sector to work in?



# Most relevant cement skills of the future / Belgium



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## TOP 5



### Professional skills

Carbon capture & process technologies (9)

CO<sub>2</sub> transport & handling (6)

Digitalisation & automation (5)

Health & safety monitoring & mapping (4)

Knowledge of electrical infrastructure (4)



### Digital skills

Communication & collaboration (11)

Digital process control (9)

Information and data literacy (7)

Data safety (6)

Digital content creation (3)



### Compliance skills

Sustainability monitoring, reporting & certification (7)

Occupational health & safety (7)

Circular Economy & Waste Management (5)

Plant safety & safety of communities (5)

Emission trading & emission control (4)



## TOP 8 Training topics

CO<sub>2</sub> utilisation, storage and transport (10)

Carbon capture technologies (6)

Energy efficiency (6)

Plant safety and community/stakeholder management (6)

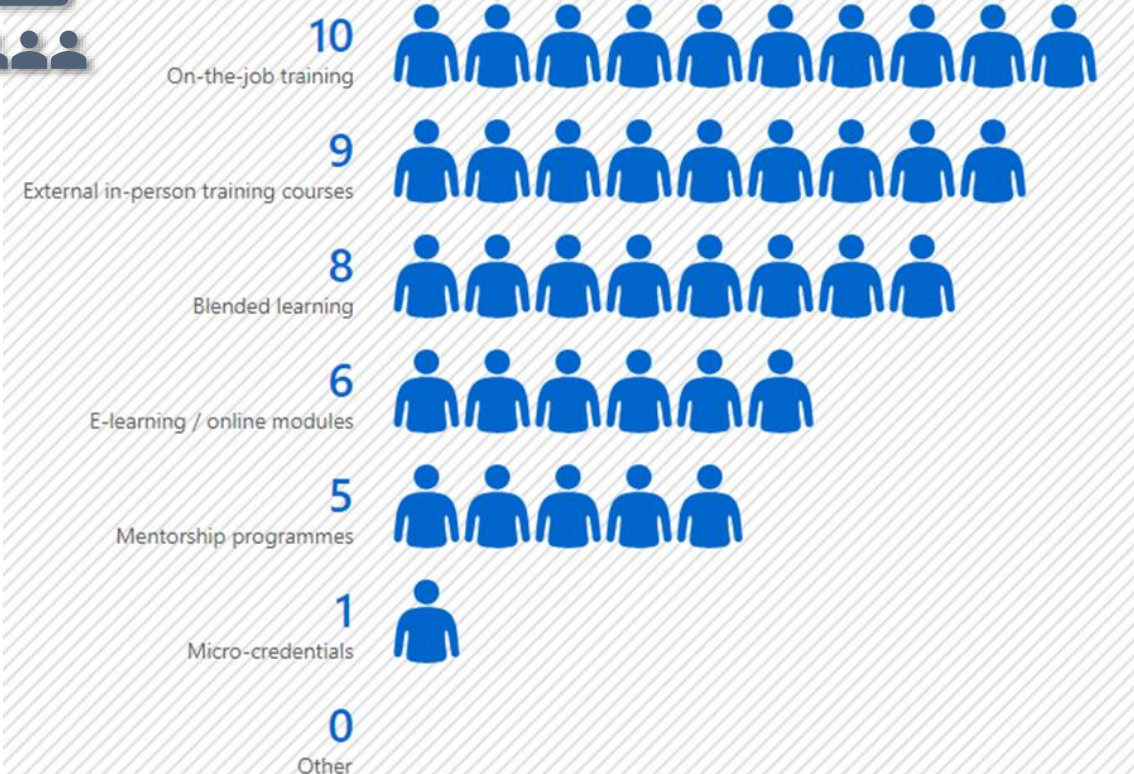
New materials and clinker-efficient cements (SCM) (5)

Circular economy & waste management (5)

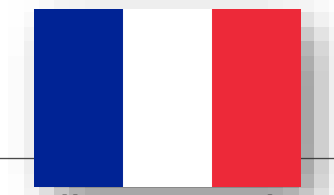
Digital skills (e.g. process control) (5)

Occupational health & safety (5)

## Future training formats



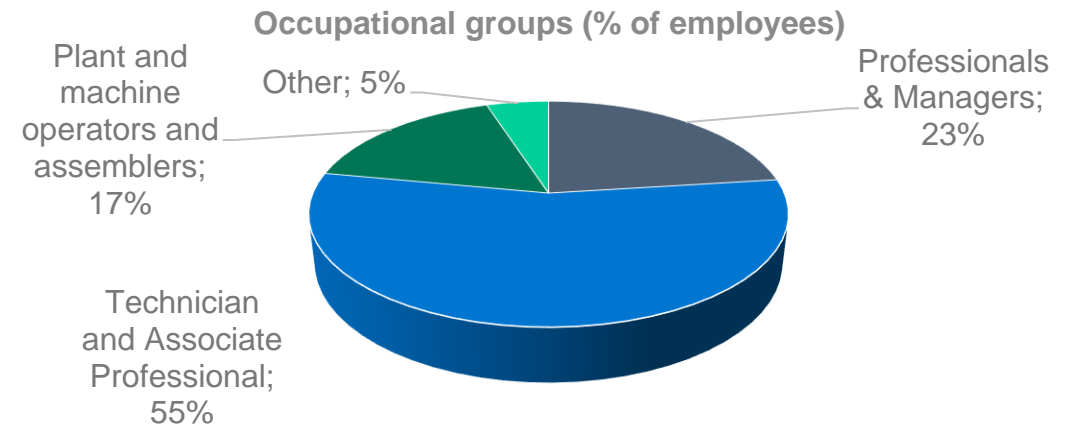
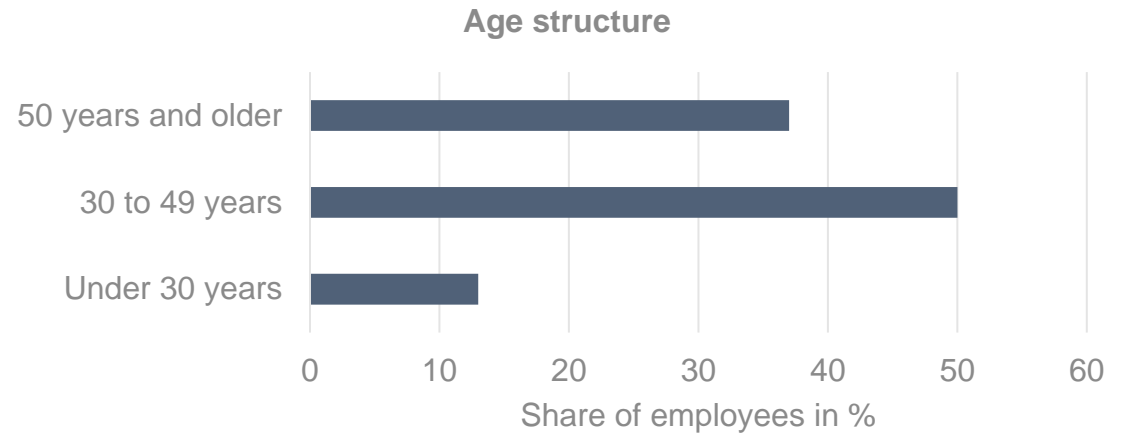
# Case study France



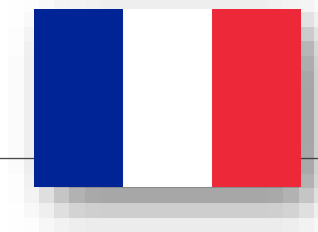
vdz

Based on social data input from companies and national associations (not part of online questionnaire)

- One response from one association
- France cement industry with predominantly large companies
- Age structure: 50% of employees between 30 to 49 years old; further 37% are older
- More than half of employees are technicians and associate professionals
- Public/private concept of apprenticeship in France with electrical and mechanical maintenance technicians, health and safety facilitators as well as operation technicians as most relevant types for the cement industry
- Share of apprentices among total employees below 5%
- 27 annual training hours per employee on average

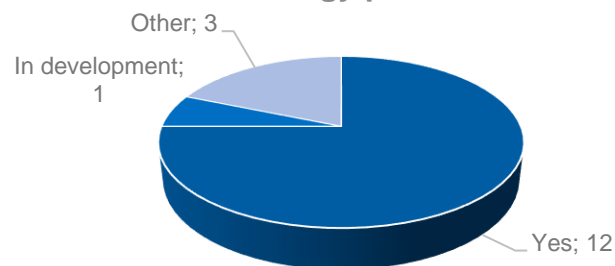


# Cement Skills in France / status quo analysis

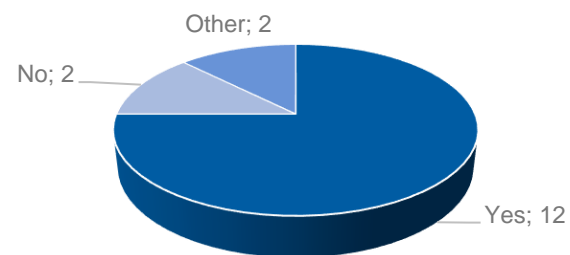


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Company with training strategy plan?



Company with collective agreement on employee training?



Ranking of reasons for varying training participation

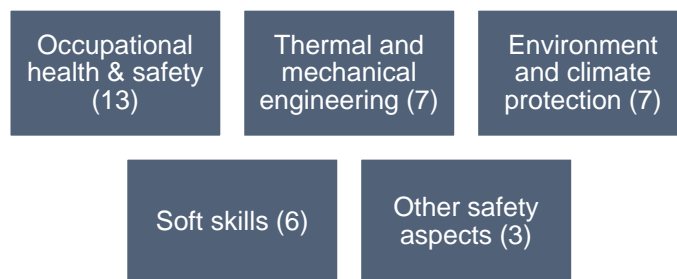


Time for training

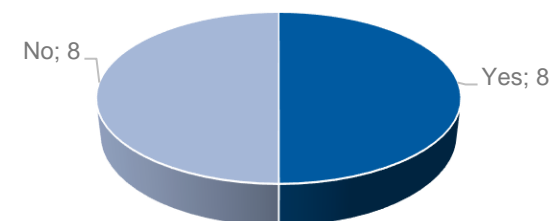
Training needs

Cost of training

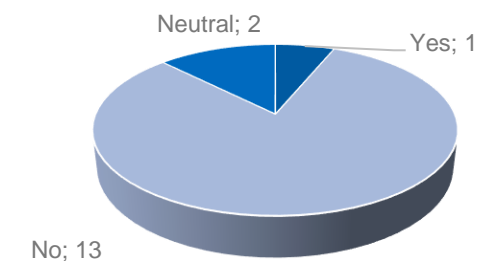
TOP 5 Training topics



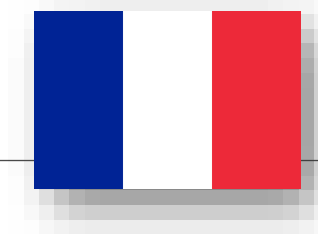
Communication of health & safety concerns of new technologies?



Is the cement industry an attractive sector to work in?



# Most relevant cement skills of the future / France



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## TOP 5



### Professional skills

Carbon capture & process technologies (16)

CO<sub>2</sub> transport & handling (10)

Digitalisation & automation (7)

Health & safety monitoring & mapping (5)

Risk managements & new safety protocols (5)



### Digital skills

Data safety (13)

Digital process control (11)

Information and data literacy (10)

Virtual reality tools (7)

Communication and collaboration (4)



### Compliance skills

Circular economy & waste management (11)

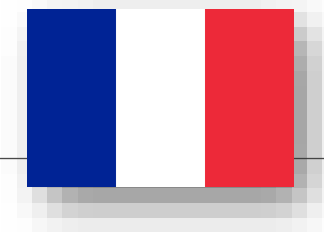
Environmental Law & mitigation strategies (9)

Emission trading and emission control (8)

Plant safety & safety of communities (8)

Occupational health and safety (7)

# Training topics and formats of the future / France



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## TOP 8 Training topics

Alternative fuels  
and biomass (13)

Carbon capture  
technologies (13)

CO<sub>2</sub> utilisation,  
storage and  
transport (9)

New materials  
and clinker-  
efficient cements  
(SCM) (8)

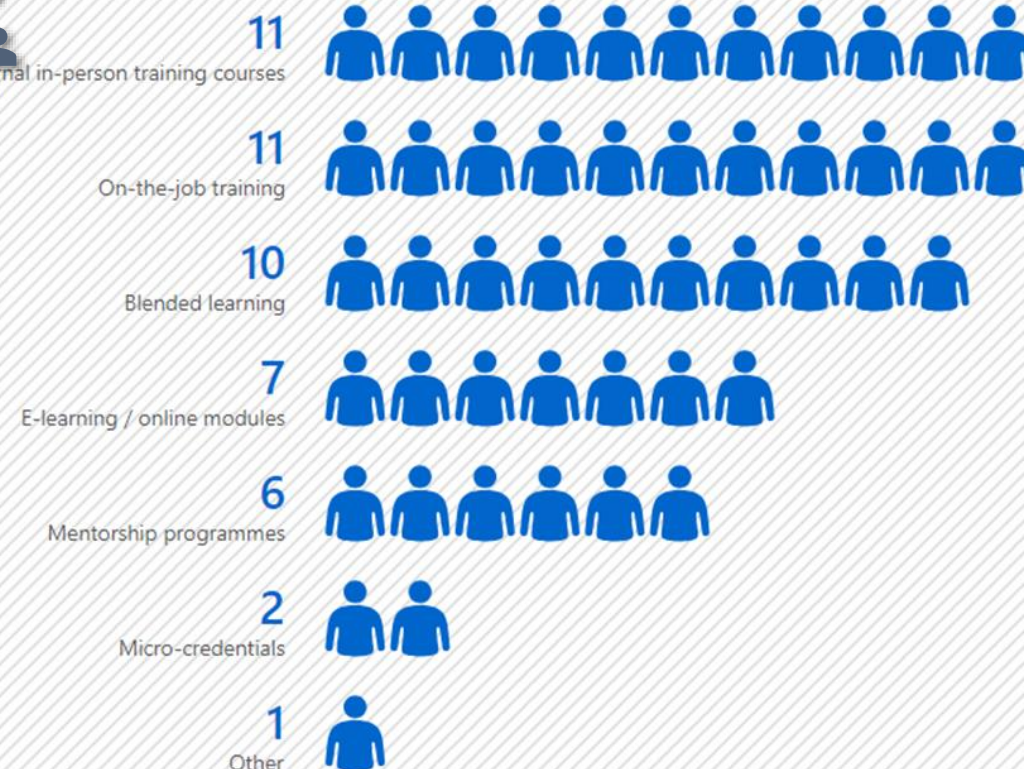
Energy efficiency  
(6)

Circular economy  
& waste  
management (6)

Occupational  
health & safety  
(6)

Emission trading  
and emission  
control (4)

## Future training formats



Note: 16 participants; questions with multiple selection; figures in brackets show how many participants selected this option; People graph also refers to a question with multiple selection, figures represent amount of responses for each category

# Case study Germany

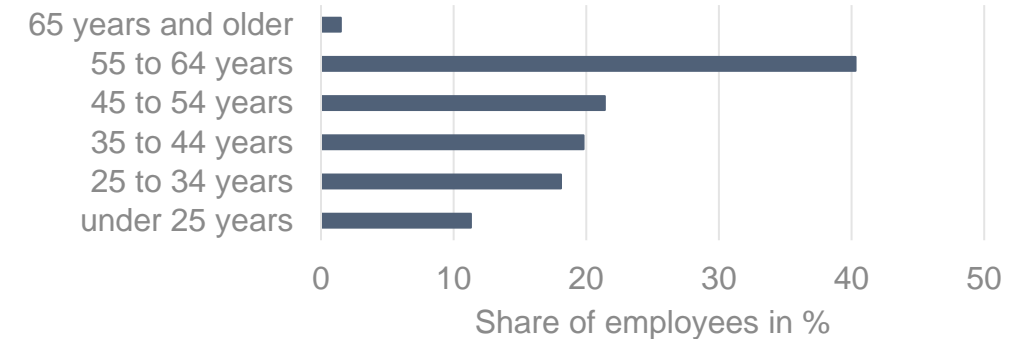


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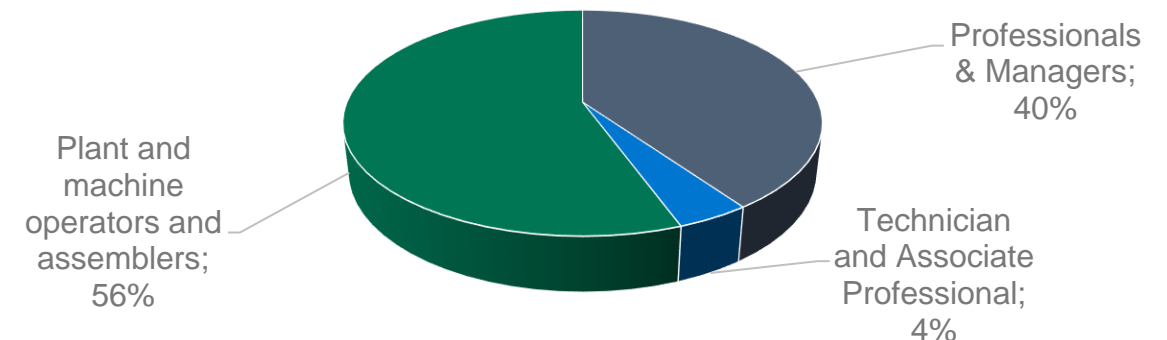
Based on social data input from companies and national associations (not part of online questionnaire)

- Two responses from one association and one company
- German cement industry with a mix of large and medium-sizes companies
- Age structure: 40% of employees between 55 to 64 years old; share of young employees below 34 years is significantly lower and a major demographic challenge across different industries in Germany
- More than half of employees are plant and machine operators and assemblers
- Proven system consisting of dual training and dual study programmes that offers a combination of theoretical apprenticeship training at a vocational school and practical training at a company
- Share of apprentices among total employees below 5%
- 21 to 40 annual training hours per employee on average

Age structure



Occupational groups (% of employees)

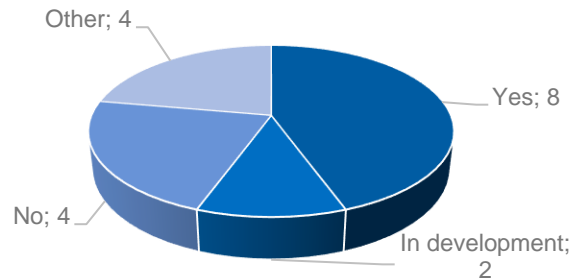


# Cement Skills in Germany / status quo analysis

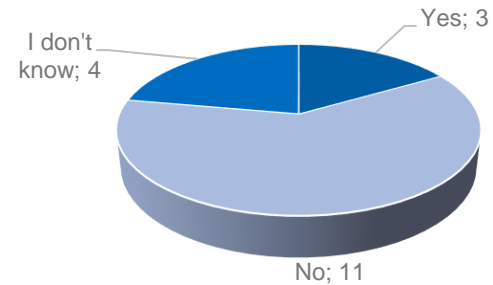


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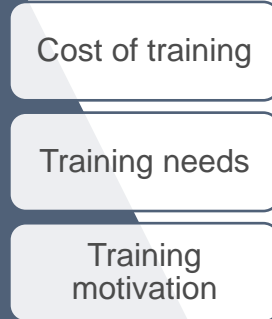
Company with training strategy plan?



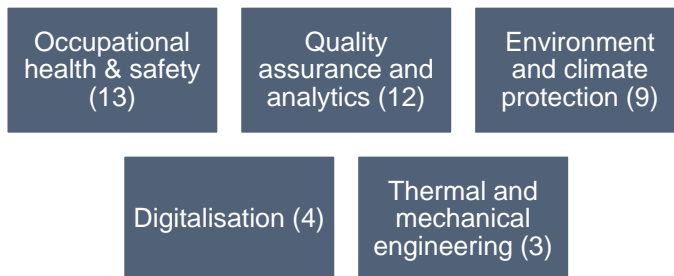
Company with collective agreement on employee training?



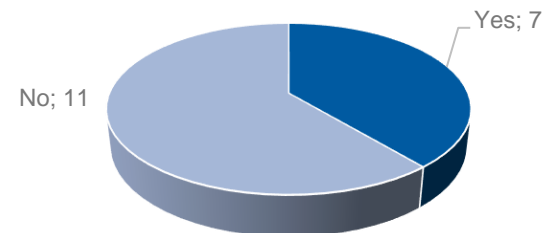
Ranking of reasons for varying training participation



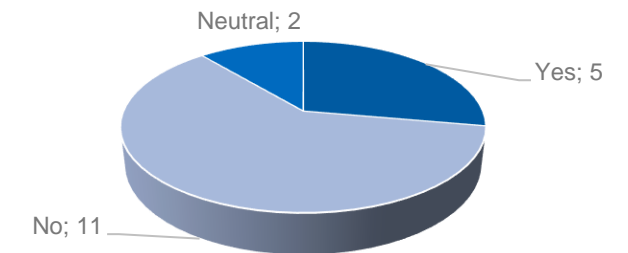
TOP 5 Training topics



Communication of health & safety concerns of new technologies?



Is the cement industry an attractive sector to work in?



# Most relevant cement skills of the future / Germany



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## TOP 5



### Professional skills

Carbon capture & process technologies (12)

CO<sub>2</sub> transport & handling (10)

Digitalisation & automation (9)

Chemical knowledge of new material & gases (6)

Knowledge of electrical infrastructure & processes (5)



### Digital skills

Digital process control (15)

Data safety (13)

Information and data literacy (13)

Communication and collaboration (11)

Digital content creation (1)



### Compliance skills

Emission trading and emission control (11)

Occupational health and safety (11)

Circular economy & waste management (8)

Sustainability monitoring, reporting & certification (6)

International trade & carbon leakage (CBAM) (5)



## TOP 8 Training topics

CO<sub>2</sub> utilisation,  
storage and  
transport (13)

Carbon capture  
technologies  
(11)

Energy  
efficiency (9)

Alternative fuels  
and biomass (8)

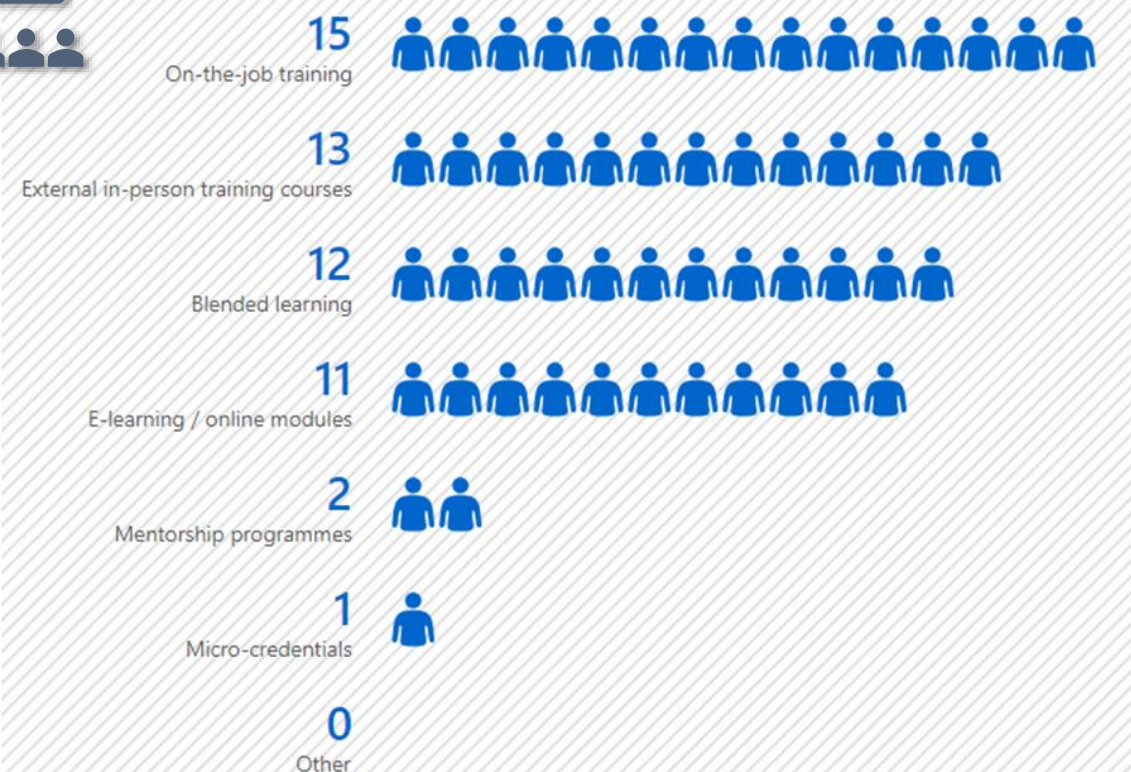
Circular  
Economy &  
waste  
management (7)

Hydrogen (6)

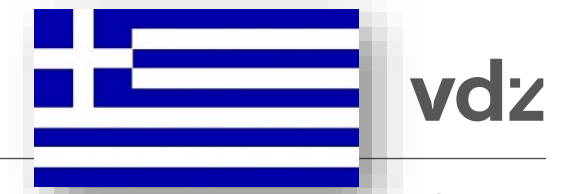
Emission trading  
and emission  
control (6)

Cyber security  
(5)

## Future training formats



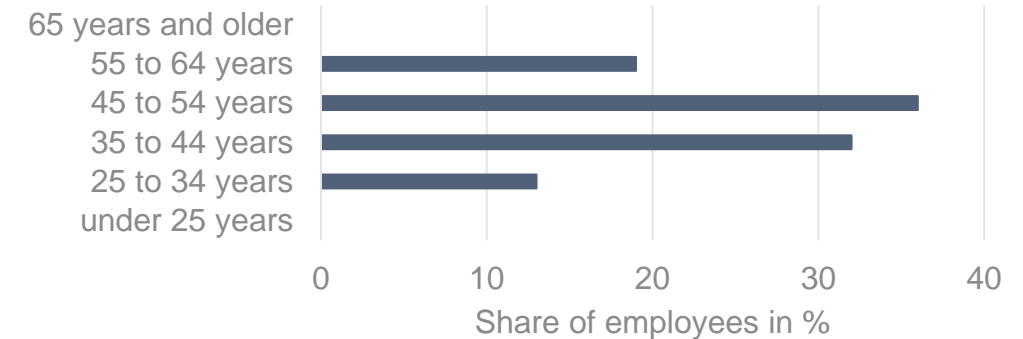
# Case study Greece



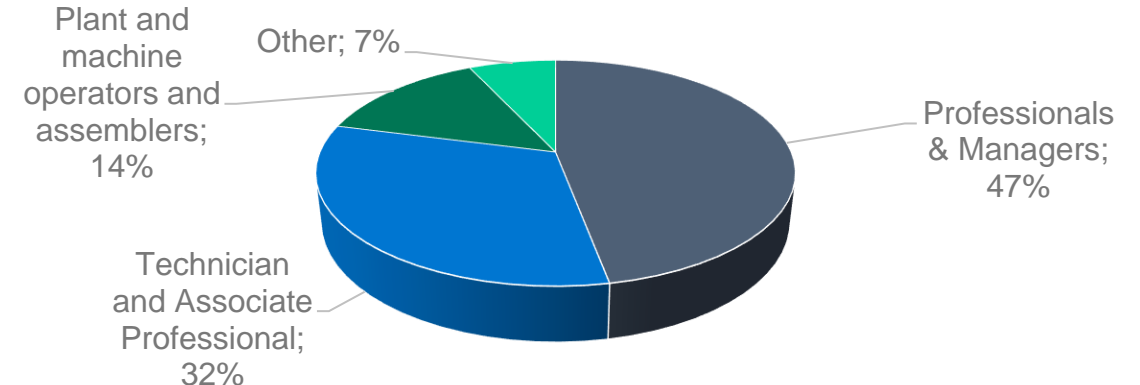
Based on social data input from companies and national associations (not part of online questionnaire)

- One response from one association
- Greek cement industry with predominantly large companies
- Age structure: two thirds of employees between 35 and 54 years old
- Almost half of employees are professionals & managers
- Mix of public and private apprenticeship concepts with technical highschoools, universities and colleges
- Further apprenticeship institutions are EPAL (Vocational Lyceums - secondary level technical schools) & IEK (Vocational training institutes) & Post-graduate training programs offered by public & private universities, colleges & business schools
- Share of apprentices among total employees below 5%
- 21 to 40 annual training hours per employee on average

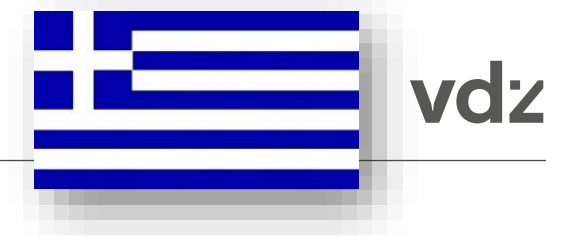
Age structure



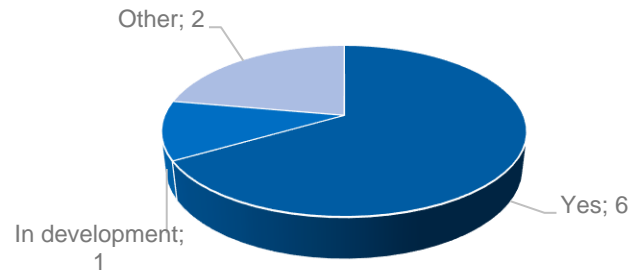
Occupational groups (% of employees)



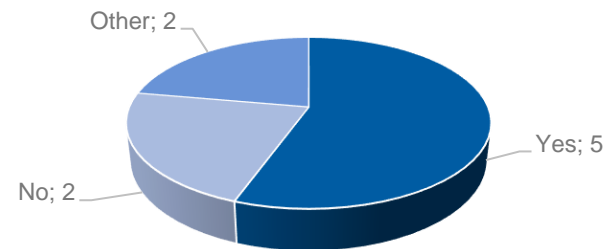
# Cement Skills in Greece / status quo analysis



Company with training strategy plan?



Company with collective agreement on employee training?

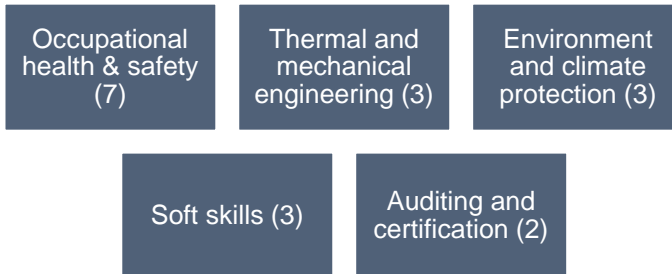


Ranking of reasons for varying training participation

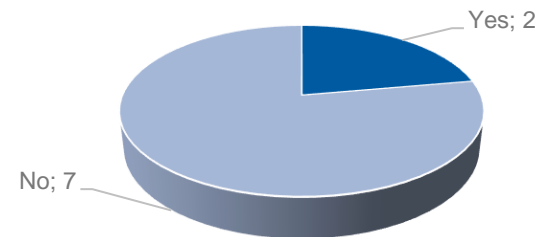


- Training needs
- Training motivation
- Time for training

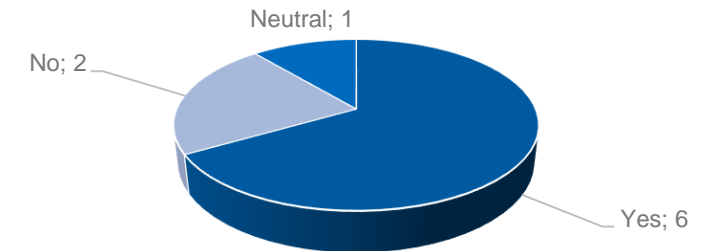
TOP 5 Training topics



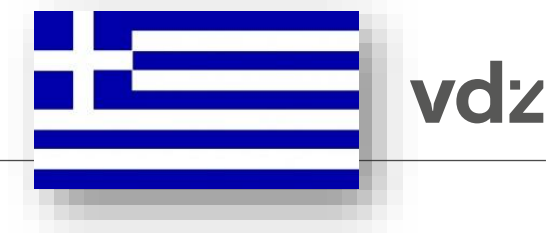
Communication of health & safety concerns of new technologies?



Is the cement industry an attractive sector to work in?



# Most relevant cement skills of the future / Greece



## TOP 5



### Professional skills

Carbon capture & process technologies (6)

CO<sub>2</sub> transport & handling (5)

Digitalisation & automation (5)

Risk management and new safety protocols (4)

Health & safety monitoring & mapping (3)



### Digital skills

Digital process control (8)

Information and data literacy (8)

Data safety (5)

Communication and collaboration (2)

Digital content creation (2)



### Compliance skills

Circular economy & waste management (6)

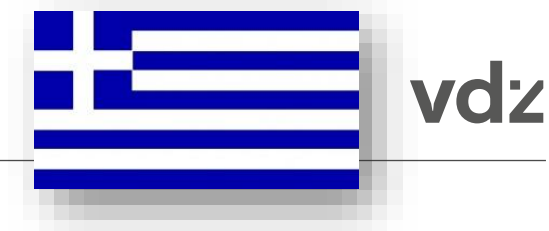
Sustainability monitoring, reporting & certification (5)

International trade & carbon leakage (CBAM) (5)

Environmental law & mitigation strategies (4)

Plant safety and safety of communities (4)

# Training topics and formats of the future / Greece



## TOP 8 Training topics

Carbon capture technologies (6)

Alternative fuels and biomass (5)

Digital skills (5)

New materials and clinker-efficient cements (SCM) (4)

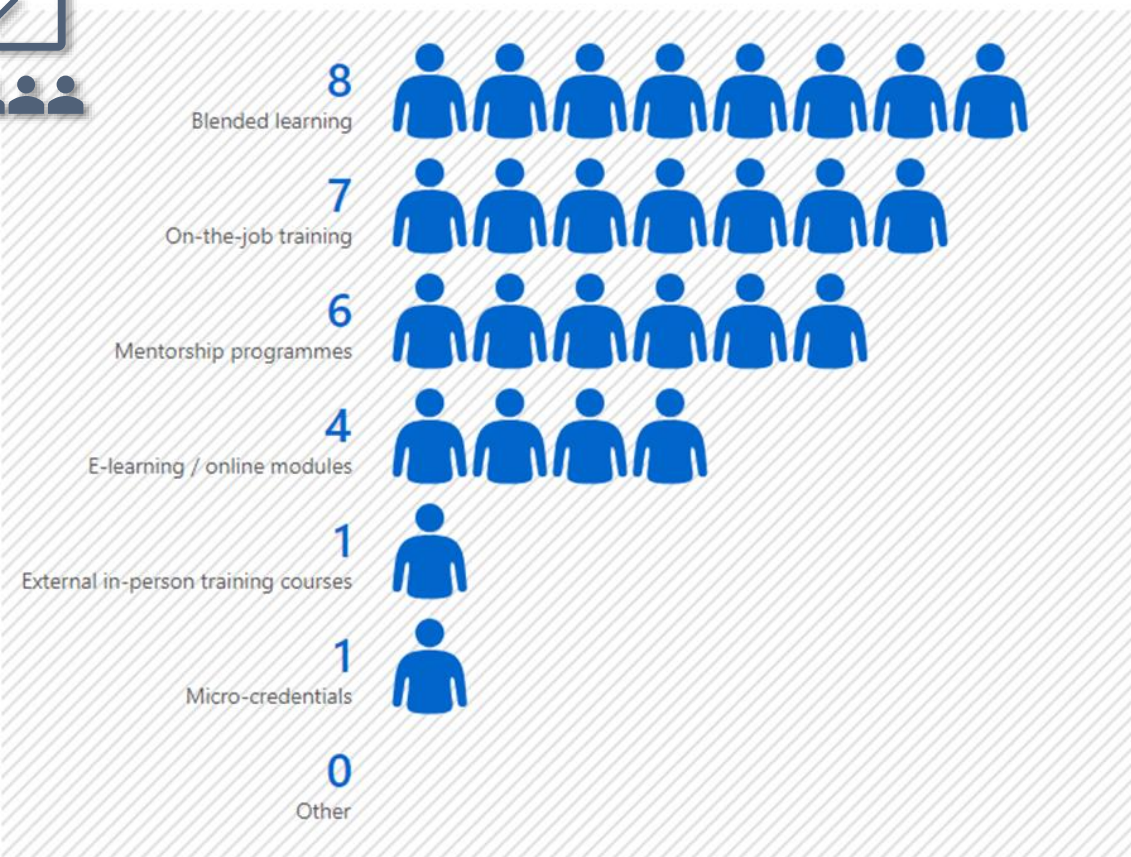
CO<sub>2</sub> utilisation, storage and transport (4)

Energy efficiency (4)

Emission trading and emission control (4)

Circular economy & waste management (3)

## Future training formats



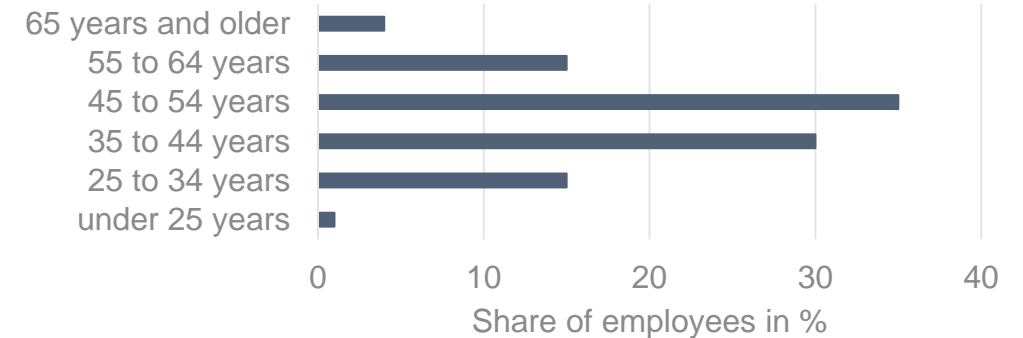
# Case study Poland



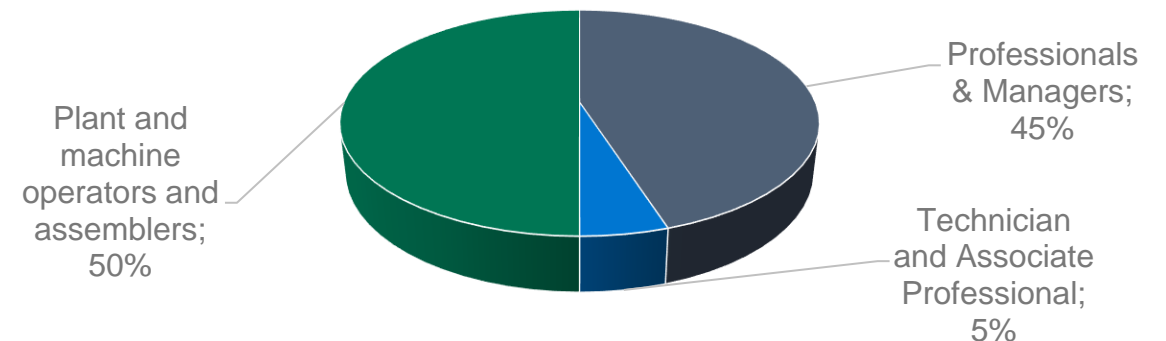
Based on social data input from companies and national associations (not part of online questionnaire)

- One response from one association
- Polish cement industry with small and medium sized companies as well as large companies, with balanced coverage
- Age structure: two thirds of employees between 35 and 54 years old
- Half of employees are plant & machine operators and assemblers
- Private concept of apprenticeship
- Machine operators and electricians with public exams
- Vocational schools in which students undergo professional internships in private companies as one of the elements of passing the exam
- Share of apprentices among total employees below 5%
- 10 to 20 annual training hours per employee on average

Age structure



Occupational groups (% of employees)

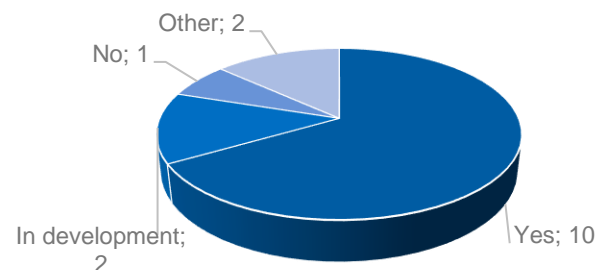


# Cement Skills in Poland / status quo analysis

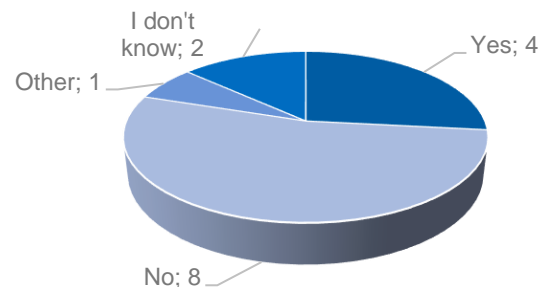


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Company with training strategy plan?



Company with collective agreement on employee training?



Ranking of reasons for varying training participation

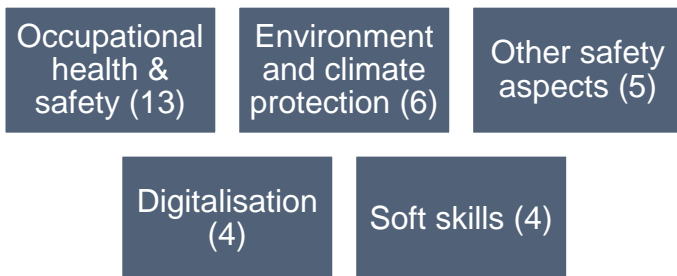


Training needs

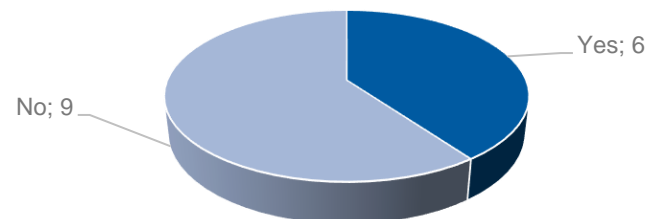
Training motivation

Time for training

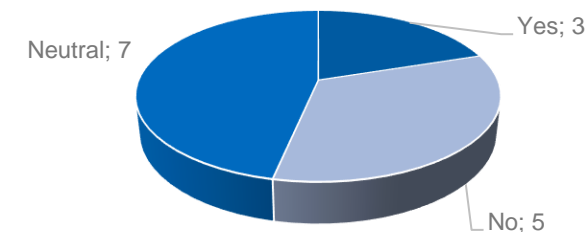
TOP 5 Training topics



Communication of health & safety concerns of new technologies?



Is the cement industry an attractive sector to work in?



Note: 15 participants; TOP 5 Training topics = question with multiple selection; figures in brackets show how many participants selected this option

# Most relevant cement skills of the future / Poland



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## TOP 5



### Professional skills

Carbon capture & process technologies (12)

CO<sub>2</sub> transport & handling (9)

Digitalisation & automation (7)

Health & safety monitoring & mapping (7)

Chemical knowledge of new materials & gases (3)



### Digital skills

Digital process control (13)

Information and data literacy (10)

Data safety (8)

Communication and collaboration (8)

Virtual reality tools (4)



### Compliance skills

Emission trading and emission control (13)

Sustainability monitoring, reporting & certification (9)

International trade & carbon leakage (CBAM) (8)

Occupational health and safety (8)

Circular economy & waste management (5)



## TOP 8 Training topics

New materials  
and clinker-  
efficient cements  
(SCM) (8)

CO<sub>2</sub> utilisation,  
storage and  
transport (8)

Digital skills (8)

Alternative fuels  
and biomass (7)

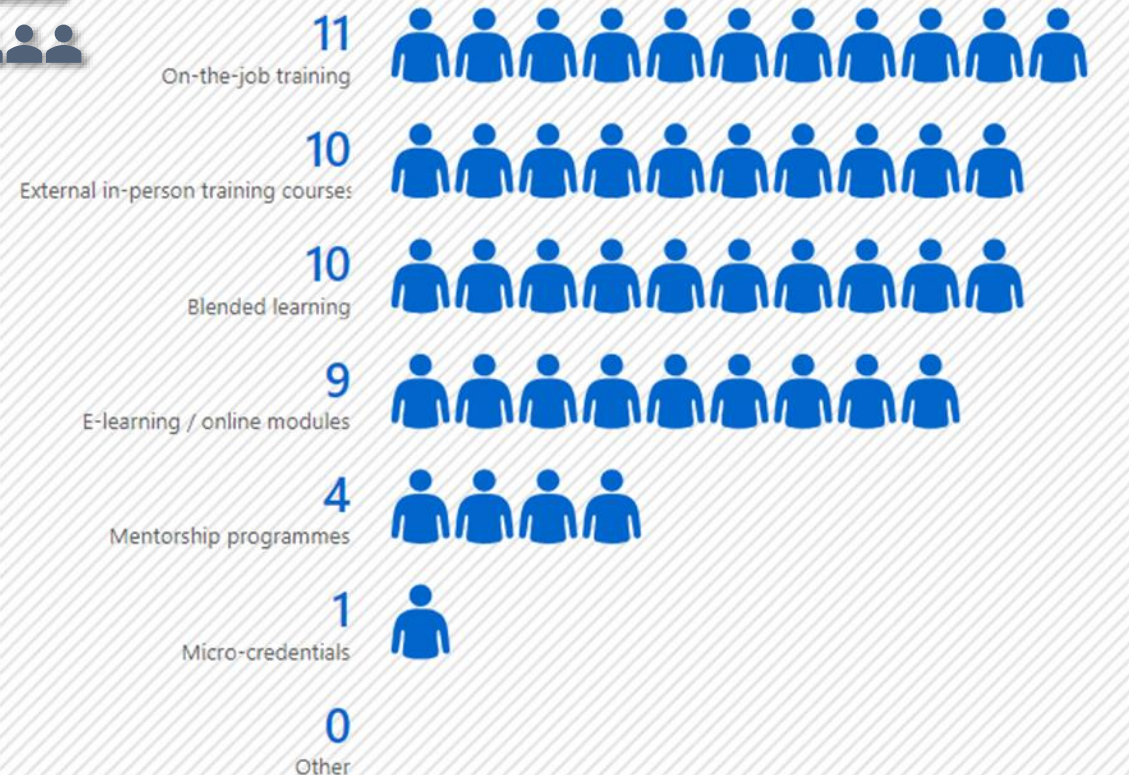
Carbon capture  
technologies (7)

Occupational  
health & safety  
(7)

Cyber security (5)

Management  
systems (4)

## Future training formats



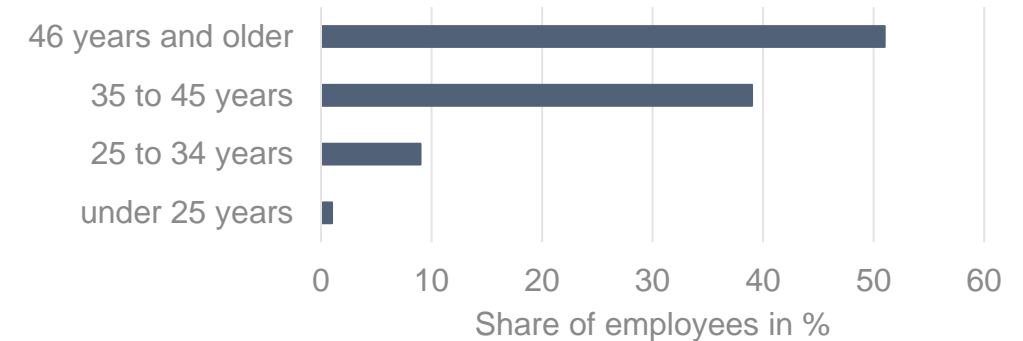
# Case study Spain



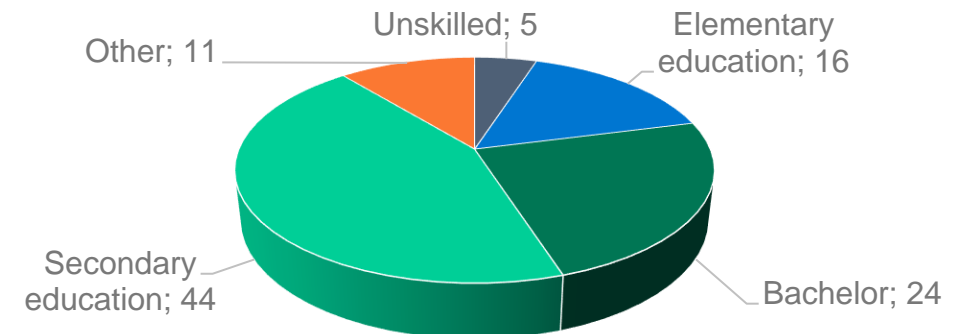
Based on social data input from companies and national associations (not part of online questionnaire)

- Two responses from one company and one association
- Cement industry with predominantly large companies
- Age structure: more than half of employees older than 45 years
- Around 12% of employees are women
- Almost half of the employees with secondary education, further 24% with Bachelor's degree
- Public/Private concept of apprenticeship with industrial mechanics, electronics technicians, chemical laboratory technicians, plant mechatronics technicians and office clerks as most relevant types for the cement industry
- Dual Vocational Training is a new modality within vocational training; combining teaching and learning processes in the company and in the training center
- 10 to 20 annual training hours per employee on average

Age structure



Levels of education (% of employees)

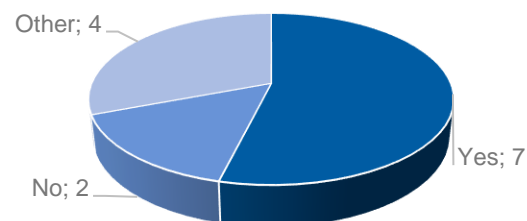


# Cement Skills in Spain / status quo analysis

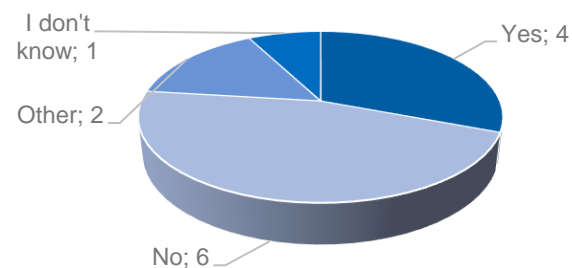


vdz

Company with training strategy plan?



Company with collective agreement on employee training?



Ranking of reasons for varying training participation



Training needs

Training motivation

No suitable training offers

TOP 5 Training topics

Occupational health & safety (11)

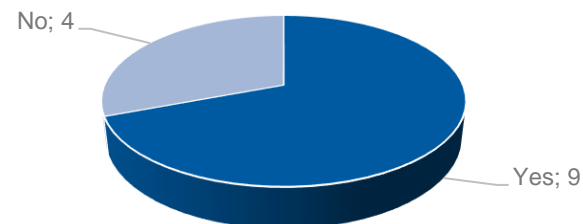
Environment and climate protection (8)

Other safety aspects (4)

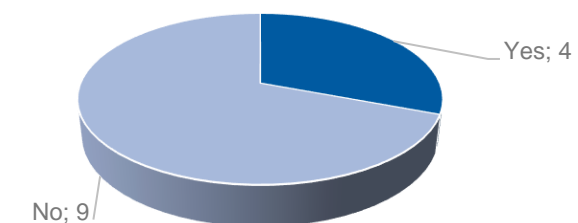
Digitalisation (4)

Soft skills (3)

Communication of health & safety concerns of new technologies?



Is the cement industry an attractive sector to work in?



Note: 13 participants; TOP 5 Training topics = question with multiple selection; figures in brackets show how many participants selected this option

# Most relevant cement skills of the future / Spain



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TOP 5



## Professional skills

Carbon capture & process technologies (10)

Digitalisation & automation (9)

CO<sub>2</sub> transport & handling (8)

Risk management and new safety protocols (4)

Chemical knowledge of new materials & gases (4)



## Digital skills

Data safety (11)

Digital process control (9)

Information and data literacy (7)

Communication and collaboration (4)

Virtual reality tools (4)



## Compliance skills

Circular economy & waste management (9)

Emission trading and emission control (6)

Occupational health and safety (6)

Environmental law & mitigation strategies (5)

Sustainability monitoring, reporting & certification (5)

# Training topics and formats of the future / Spain



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## TOP 8 Training topics

Carbon capture technologies (8)

Circular economy & waste management (8)

Occupational health & safety (8)

CO<sub>2</sub> utilisation, storage and transport (7)

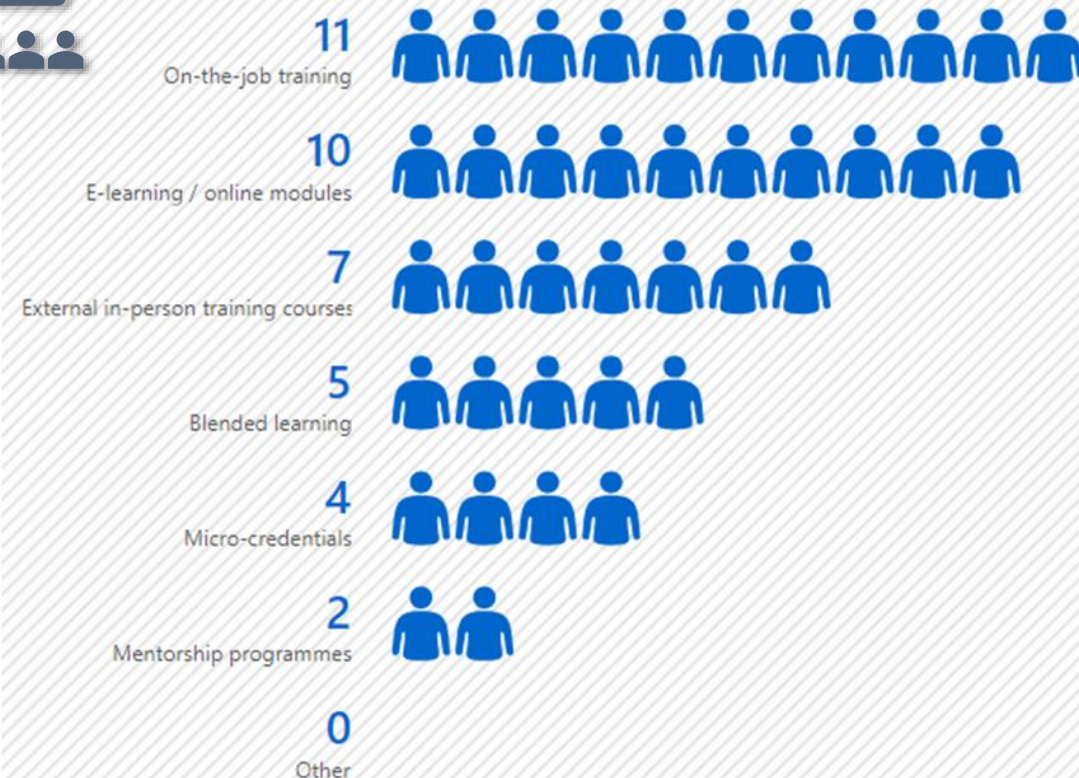
Alternative fuels and biomass (6)

Digital skills (5)

Management systems (4)

Leadership (3)

## Future training formats



Note: 13 participants; questions with multiple selection; figures in brackets show how many participants selected this option; People graph also refers to a question with multiple selection, figures represent amount of responses for each category

# Case studies at a glance

## Spotlight on some of the key findings



- Collective agreements on employee training appear to have a very different status in the various countries. France, Belgium and Greece in particular rely more heavily on this instrument. Other dedicated agreements on training between companies and other institutions seem to exist in all countries to some extent, showing a particular importance in Spain.
- The communication of health and safety issues arising from the use of new technologies at plant level is reported by the majority of respondents in Spain, while in other case study countries it plays a less important role, yet.
- Overall, there are similar priorities for future skills, training topics and formats in all countries, most of which are related to the decarbonisation of industry, i.e. carbon capture technologies and CO<sub>2</sub> management. There are only minor differences in the lower-ranked skills and training topics, such as knowledge of electrical infrastructure, cyber security, hydrogen and leadership. In terms of training formats, mentorship programmes are considered to be more important in Greece.
- Attractiveness of the sector is reported to be positive or rather neutral in Greece and Poland. In all other countries the cement industry is, by the majority of respondents, not perceived to be an attractive sector to work in.

Evolving the well-established

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