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Supporting Policy Engagement Cement

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Abbreviations and acronyms

CCUS	Carbon capture, utilization and storage
CO₂	Carbon dioxide
EPDs	Environmental Product Declarations
EU	European Union
FOAK	First-of-a-kind
GCCA	Global Cement and Concrete Association
GGBS	Ground Granulated Blast Furnace Slag
GHG	Greenhouse gas
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
MPP	Mission Possible Partnership
NDC	Nationally Determined Contribution
OECD	Organisation for Economic Co-operation and Development
SCMs	Supplementary cementitious materials
UK	United Kingdom
UNEP	United Nations Environment Programme
WEF	World Economic Forum



The purpose of policy briefing notes

This publication is part of a series of policy briefing notes that aim to identify key decarbonization levers and policies to support banks' own policy engagement work. The series aims to assist banks in:

- **Advocating for a supportive, enabling environment** for mobilizing capital flows towards net-zero supportive financing; and
- **Driving the dialogue to advance policies** that stimulate markets and spur capital deployment to accelerate the decarbonization of the real economy.

These sectoral policy briefing notes aim to **prioritize policies that promote bankability** and accelerate additional capital investments to decarbonize carbon-intensive sectors.

Banks are encouraged to independently use these policy briefing notes to engage with key stakeholders from the real economy with a view to promoting an enabling environment at national and regional level. As such, **banks should tailor their engagement to local regulatory contexts**. All policy engagement, advocacy and data-sharing activities suggested in this brief must be conducted in strict compliance with all applicable local and international laws, including (but not limited to) competition and anti-trust regulations.

How banks can use this policy briefing notes

- **Leverage key messages** to develop an independent policy position and engagement strategy
- **Organize internal workshops** with relationship managers, sustainability teams, public affairs teams and other key stakeholders to determine which policies are most relevant to their markets
- **Identify key fora and stakeholders** that could influence priority policies and engage with them using this document's messages

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Executive summary

Concrete is essential to modern construction and the cement it contains constitutes one of the world's most emissions-intensive industries. Achieving net-zero cement will require a combination of breakthrough technologies, material innovation and an enabling policy environment. As demand for cement continues to grow in many emerging economies, accelerating the sector's transition is increasingly urgent.

While many decarbonization technologies already exist, their deployment remains constrained by high costs, regulatory barriers, limited infrastructure and insufficient demand for low-carbon cement. This report outlines targeted policy recommendations designed to address these constraints and crowd in private finance.

Table 1 summarizes the main policy recommendations presented in this report, mapped against the barriers that they help to address. Table 2 summarizes the policy actions linked to this report's key recommendations that banks may support.

Three priorities for accelerating cement decarbonization:

- Create demand for low-carbon cement
- Reduce the cost and risk of emerging decarbonization technologies
- Improve long-term policy and investment certainty

More specifically, action is required across six decarbonization levers:

- **Carbon capture, utilization and storage (CCUS)** to address unavoidable process emissions from clinker production (the high carbon emitting stage).
- **Use concrete more efficiently** through improved design, optimization and material efficiency to reduce demand for cement.
- **Supplementary cementitious materials (SCMs)** to reduce clinker content while maintaining concrete performance.
- **Alternative cement chemistries** that lower or eliminate process emissions associated with conventional Portland clinker.
- **Fuel switching** to replace fossil fuels with sustainable biomass, waste-derived fuels and other lower-carbon energy sources.
- **Use of electricity and hydrogen** to progressively electrify cement production and deploy renewable hydrogen where technically and economically viable.

Banks have a critical role in enabling this transition. By financing low-carbon technologies, engaging clients on credible transition strategies and supporting enabling public policies, they can help reduce investment risk and mobilize private capital at the scale required.

Stable and predictable policy frameworks improve project bankability, reduce the cost of capital and create the market conditions necessary for commercial deployment of innovative technologies to decarbonize the cement sector.

In parallel to decarbonizing the cement sector, governments are encouraged to promote low-carbon alternatives to cement, such as wood and timber (where appropriate), while encouraging whole-life carbon assessments to determine the most suitable material for each application.

Table 1: Summary of policy areas and recommendations for the cement sector

Policy areas	Policy recommendations	Main challenge addressed
1. Carbon pricing	1.1 Establish predictable carbon pricing frameworks	Investment certainty
2. CCUS support	2.1 Develop shared carbon dioxide (CO ₂) transport and storage infrastructure 2.2 Establish clear legal and regulatory frameworks for CCUS	Large capital projects
3. Green procurement	3.1 Adopt low-carbon public procurement policies 3.2 Require environmental product declarations (EPDs) and standardized embodied-carbon disclosure	Market demand
4. Building codes and standards	4.1 Adopt performance-based standards 4.2 Approve low-clinker cements, supplementary cementitious materials (SCMs), and alternative binders	Technology adoption
5. Circular economy	5.1 Promote construction and demolition waste recovery and recycling	Resource efficiency
6. Financial incentives	6.1 Develop revenue-support mechanisms 6.2 Provide tax credits and grants for first-of-a-kind (FOAK) projects	FOAK investment

Table 2: Summary of policy actions for the cement sector

1.1 Establish predictable carbon pricing frameworks	4.1 Adopt performance-based standards
▪ Establish long-term carbon pricing frameworks with clear price trajectories, such as price floors or corridors	▪ Update building codes to prioritize material performance rather than prescriptive compositions ▪ Encourage the use of life-cycle emissions alongside traditional performance criteria
2.1 Develop shared CO₂ transport and storage infrastructure	4.2 Approve low-clinker cements, SCMs, and alternative binders
▪ Develop regional CO₂ transport and storage networks serving multiple industrial facilities ▪ Coordinate infrastructure planning across industrial clusters and jurisdictions	▪ Streamline approval processes for low-carbon cement technologies ▪ Harmonize national standards governing SCMs and alternative binders
2.2 Establish clear legal and regulatory frameworks for CCUS	5.1 Promote construction and demolition waste recovery and recycling
▪ Establish clear permitting, monitoring and long-term liability frameworks for CO₂ storage ▪ Harmonize regulations governing cross-border CO₂ transport and storage	▪ Invest in recycling and material recovery infrastructure ▪ Encourage the use of recycled construction materials through public procurement
3.1 Adopt low-carbon public procurement policies	6.1 Develop revenue-support mechanisms
▪ Introduce whole-life-carbon requirements for publicly procured buildings and infrastructure ▪ Progressively tighten embodied-carbon thresholds as low-carbon technologies mature	▪ Introduce contracts for difference for low-carbon cement ▪ Establish transparent long-term revenue-support schemes for emerging technologies
3.2 Require EPDs and standardized embodied-carbon disclosure	6.2 Provide tax credits and grants for FOAK projects
▪ Require standardized EPDs for cement and concrete used in public procurement and major construction projects ▪ Develop national embodied-carbon databases and digital reporting platforms	▪ Provide competitive grants and investment tax credits for FOAK projects ▪ Support pilot, demonstration and early commercial deployment of innovative technologies



Cement sector background

Cement markets can be very localized and competitive conditions can vary by geography, while also being highly fragmented globally, with the top 10 producers accounting for less than 30 per cent of world production. India and China account for 63 per cent of global cement production and are expected to drive future demand, together with a wider set of emerging and developing economies (EMDEs) (Mission Possible Partnership (MPP), 2022).

Impact on climate change

Concrete is the world's most widely used construction material and is essential for the development of buildings, transport infrastructure, renewable energy and urbanization. However, production of the cement contained in concrete is one of the most emissions-intensive industrial activities due to the combination of energy-intensive manufacturing processes and the unavoidable release of CO₂ when limestone raw materials are heated (calcined) at high temperatures (process emissions).

Percentage of total CO₂ emissions of the concrete and cement sector

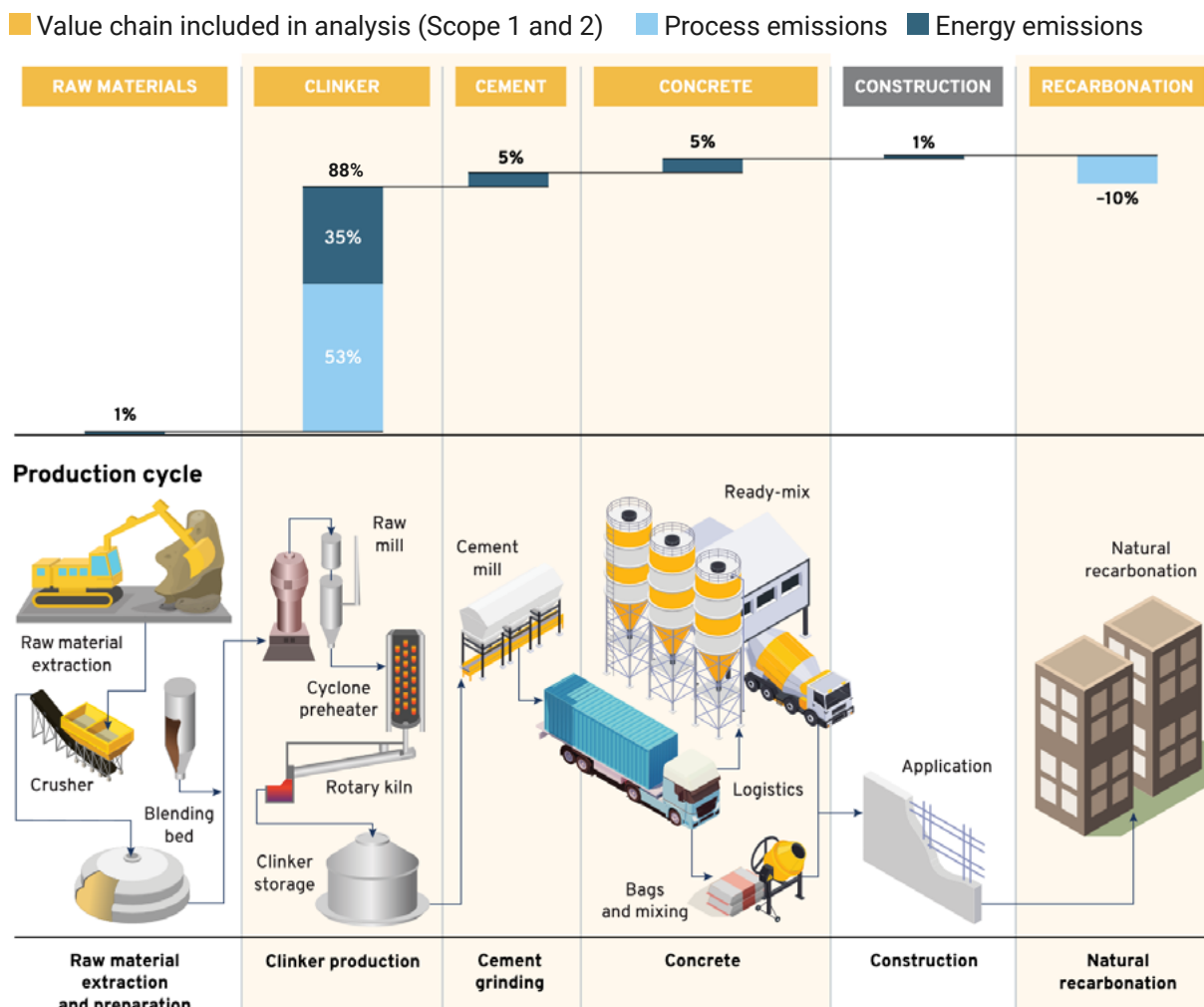


Figure 1: Breakdown of Scope 1 and 2 CO₂ emissions for the concrete and cement sectors (MPP, 2022)

The cement sector is responsible for approximately 7–8 per cent of global CO₂ emissions, making it one of the largest industrial sources of greenhouse gas (GHG) emissions worldwide. Because process emissions are inherent to conventional clinker production, the sector is widely recognized as one of the most difficult industries to decarbonize (United Nations Industrial Development Organization, 2025).

Approximately **50–60 per cent of cement sector emissions arise from process emissions generated during clinker production**, while the remaining emissions originate primarily from fossil fuel combustion used to heat cement kilns (Intergovernmental Panel on Climate Change [IPCC], 2022).

Climate mitigation progress

The cement sector has made significant progress in establishing long-term decarbonization objectives and improving production efficiency. In 2021, the Global Cement and Concrete Association (GCCA), which represents around 80 per cent of cement production outside China, published the industry's first global Net Zero Roadmap, outlining a pathway to net-zero concrete by 2050 (GCCA, 2021). The roadmap was subsequently updated in 2024 to reflect technological progress and stronger implementation pathways (GCCA, 2024).

Over recent decades, cement manufacturers have steadily improved kiln efficiency. In addition, they have increased the use of alternative fuels such as biomass and waste-derived fuels, which has helped reduce reliance on coal and petroleum coke. Many producers have also lowered the clinker content of cement by incorporating supplementary cementitious materials (SCMs), including blast furnace slag (a by-product of steel production), fly ash (from coal fired power generation), calcined clay and natural pozzolans. Collectively, these substantially reduce life-cycle emissions. As a result, the global **CO₂ intensity of cement production has decreased by 25 per cent since 1990**, measured in tonnes of CO₂ per tonne of cement produced (International Energy Agency [IEA], 2024).

Climate mitigation challenges

Despite this progress, **the cement sector remains substantially off track to achieve global net-zero emissions by 2050**. Global cement demand continues to increase, particularly in emerging and developing economies where rapid urbanization and infrastructure expansion are expected to drive significant growth over coming decades (IEA, 2024).

Unlike many other industrial sectors, **most emissions from cement production originate from the chemical decomposition of limestone rather than fuel combustion**. As a result, conventional measures such as electrification or switching to low-carbon fuels such as hydrogen can address only part of the sector's emissions. Deep decarbonization therefore depends on the large-scale deployment of other innovative technologies, many of which remain commercially immature. This is particularly the case for carbon capture, utilization and storage (CCUS), which is expected to become the single largest source of emissions reductions by mid-century across most net-zero pathways for cement (MPP, 2022; GCCA, 2024).

The sector also faces significant investment challenges. Cement plants typically operate for 30–50 years and require substantial capital expenditure to modernize or replace, creating long-lived emissions lock-in and slowing technology turnover (IEA, 2024). At the same time, many low-carbon technologies require high upfront investment, uncertain revenue streams and supporting infrastructure that remains underdeveloped in many jurisdictions (World Economic Forum [WEF], 2024).

Furthermore, cement is generally a low-margin commodity sold into highly competitive local markets, limiting producers' ability to recover higher production costs associated with low-carbon technologies. **Weak market demand for low-carbon cement, inconsistent product standards, fragmented procurement practices and uncertain policy frameworks continue to constrain investment and delay commercialization of near-zero emission cement production** (MPP, 2022; WEF, 2024).

Key decarbonization levers

The cement sector requires a multi-lever approach to decarbonize. Although their contribution to the transition varies between roadmaps, **six main decarbonization levers form the backbone of this report** and are described in this section. Table 3 and Figure 2 summarize these levers in terms of their contribution to achieving net zero by 2050 for the cement sector.

Table 3: Overview of decarbonization levers for the cement sector

Decarbonization levers	Climate mitigation impact	Capital needed	Bankability	Time-horizon
CCUS	High	Very high	Medium	2030-2050
Concrete use efficiency	High	Low	High	Today
SCMs	Medium	Medium	High	Today
Alternative chemistries	Medium	High	Low	2030-2050
Fuel switching	Low	Medium	High	Today
Electricity/hydrogen	Low	Very high	Low	2035-2050

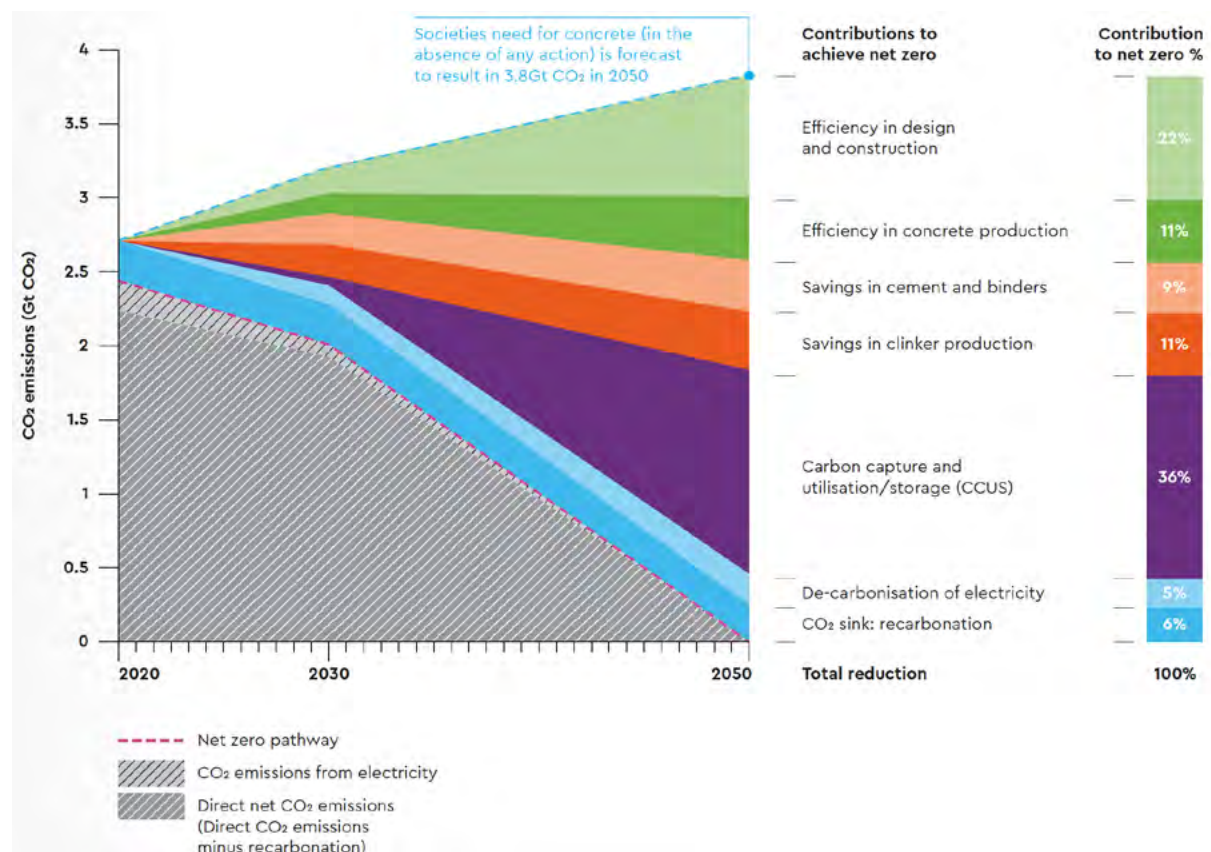


Figure 2: GCCA 2050 concrete net-zero pathway (GCCA, 2024)

Lever 1. Carbon capture, utilization and storage

CCUS is widely recognized as the most important technology for decarbonizing the cement sector because it is the only solution capable of addressing process emissions from limestone calcination. Most credible net-zero pathways rely on large-scale CCUS deployment by 2050 (IPCC, 2022; IEA, 2024; GCCA, 2024).

Cement is particularly well suited to carbon capture due to the high CO₂ concentration in kiln exhaust gases. Several capture technologies, including post-combustion capture, oxyfuel combustion and calcium looping, have reached pilot or demonstration scale, with multiple commercial projects under development (IEA, 2024; Leadership Group for Industry Transition, 2026).

Despite its importance, CCUS deployment faces significant barriers:

- **High costs:** Carbon capture requires substantial capital investment and increases production costs by at least 50 per cent currently (IEA, 2024)
- **Limited CO₂ transport and storage infrastructure:** Most cement plants lack access to pipelines, shipping networks and permanent geological storage (IEA, 2024; IPCC, 2022)
- **Technology and investment risks:** First-of-a-kind (FOAK) projects face significant technical, construction and financing risks (MPP, 2022)
- **Policy uncertainty:** The absence of predictable carbon pricing, regulatory certainty, revenue support and clear liability frameworks continues to discourage investment (IEA, 2024; IPCC, 2022)

Lever 2. Use concrete more efficiently

Improving the efficiency with which concrete is designed and used represents one of the largest and most cost-effective opportunities to reduce emissions from the cement sector. Rather than lowering emissions from production, this lever reduces the amount of cement and concrete needed to deliver the same structural function, thereby reducing clinker demand and embodied carbon (United Nations Environment Programme [UNEP], 2023; IEA, 2024).

Material efficiency includes performance-based design, optimized building geometry, high-strength concretes, improved construction practices and longer asset lifetimes. Adaptive reuse, greater reuse and recycling of concrete can be facilitated by considering end-of-life at design stage. Digital design tools, building information modelling, prefabrication and modular construction can further reduce material use and waste (IEA, 2024; MPP, 2022). The substitution of cement with low-carbon alternatives such as wood and timber may be considered, but only where appropriate and where the benefits from a whole life-cycle assessment are clear.

Because these measures rely on improved design, engineering and procurement practices rather than breakthrough technologies, they can often be implemented immediately, reducing both emissions and construction costs (UNEP, 2023).

Despite the potential of this lever, its wider adoption faces several barriers:

- **Prescriptive design standards:** Building codes often limit performance-based design and material optimization (UNEP, 2023)
- **Fragmented value chains:** Split incentives across project participants reduce accountability for minimizing embodied carbon (MPP, 2022)
- **Conservative procurement practices:** Preference for familiar specifications discourages innovative, material-efficient designs (IEA, 2024)
- **Limited life-cycle assessment:** Procurement often prioritizes upfront costs over whole-life emissions and resource efficiency (UNEP, 2023)
- **Insufficient circular economy infrastructure:** Limited markets and inconsistent standards constrain reuse and recycling of construction materials (IEA, 2024)

Lever 3. Increase the use of supplementary cementitious materials

Reducing the clinker content of cement through the increased use of SCMs is one of the most mature, cost-effective and immediately available decarbonization strategies for the cement sector. Because clinker production accounts for most cement-related emissions, partially replacing it with materials of a lower-carbon footprint can significantly reduce embodied carbon while maintaining performance (IEA, 2024; GCCA, 2024).

SCMs include industrial by-products such as Ground Granulated Blast Furnace Slag (GGBS, a by-product from steel production) and fly ash (from coal-fired power generation), as well as natural pozzolans, calcined clay and finely ground limestone. Emerging formulations such as limestone calcined clay cement demonstrate that high clinker substitution rates can be achieved while maintaining comparable performance and durability (IEA, 2024; UNEP, 2023).

In particular, calcined clay is produced from widely available kaolinitic clays, and it can use existing kilns or dedicated calciners. Limestone calcined clay cement can replace roughly 40–50 per cent of clinker while maintaining performance. It is especially important as supplies of fly ash and GGBS decline.

Despite the potential of SCMs, their wider adoption faces several barriers:

- **Declining availability of traditional SCMs:** Supplies of fly ash and GGBS are expected to decrease as the power and steel sectors decarbonize, increasing the need to commercialize alternative SCMs (IEA, 2024)
- **Restrictive standards and building codes:** Existing standards often limit clinker substitution or the use of innovative cement formulations (UNEP, 2023)
- **Supply chain constraints:** Regional variations in SCM availability and transportation costs can limit economic viability (MPP, 2022)
- **Market acceptance:** Concerns about performance, curing times and durability continue to slow adoption despite growing technical evidence (IEA, 2024)

Lever 4. Alternative cement chemistries

Developing and commercializing alternative cement chemistries is a promising long-term strategy to reduce emissions by replacing or redesigning conventional Portland clinker. Unlike clinker substitution, these technologies reduce or eliminate the need for Portland clinker through new binders that require less limestone, lower production temperatures or different chemical reactions, reducing both process and energy-related emissions (IEA, 2024; MPP, 2022).

Technologies under development include belite-rich cements, calcium sulfoaluminate cements, magnesium-based cements, alkali-activated materials and novel clinker formulations. Many offer significant emissions reduction potential while maintaining comparable performance (UNEP, 2023; IEA, 2024).

Although alternative cement chemistries currently represent only a small share of production, they are expected to play an increasingly important role in long-term decarbonization. Key barriers include:

- **Technology maturity:** Most alternative binders remain at the pilot or early commercial stage (IEA, 2024)
- **Standards and regulations:** Existing cement standards often restrict the use of novel binders and require lengthy certification processes (UNEP, 2023)
- **Limited long-term performance data:** Further evidence is needed to validate durability across applications and service conditions (MPP, 2022)
- **Supply chain and manufacturing challenges:** Scaling production will require new raw material supply chains, manufacturing processes and investment in plant modifications (IEA, 2024)

Lever 5. Fuel switching

Fuel switching is a well-established strategy for reducing combustion emissions from cement production by replacing coal and petroleum coke with lower- or zero-carbon energy sources. Cement kilns require temperatures of around 1,450°C, making the sector highly energy intensive. Replacing fossil fuels with sustainable alternatives can significantly reduce emissions while maintaining existing production processes and product quality (IEA, 2024; GCCA, 2024).

The industry has made significant progress in using alternative fuels, including biomass, refuse-derived fuel, waste wood, sewage sludge and selected industrial wastes. Cement kilns are well suited to safely co-process these fuels because of their high operating temperatures and incorporation of combustion residues into clinker (GCCA, 2024; IEA, 2024).

Waste management and co-processing are central to this lever. Co-processing refers to the simultaneous recovery of energy and material from suitable waste streams in cement kilns. This displaces fossil fuels while using the mineral ash as a raw material substitute in clinker production. When integrated into a coherent waste hierarchy, co-processing can divert non-recyclable waste from landfill, reduce methane emissions from decomposing waste and lower the cement sector's reliance on coal and petroleum coke.

Despite the potential of fuel switching, wider adoption of low-carbon fuels faces several barriers:

- **Limited sustainable biomass:** Supply constraints and competing demand raise concerns over availability and cost (IEA, 2024)
- **Waste management system constraints:** Many jurisdictions lack separate collection, sorting, drying and pre-treatment capacity, limiting the availability of quality-assured alternative fuels
- **Infrastructure and operational requirements:** Fuel switching often requires investment in handling systems and kiln modifications (MPP, 2022)
- **Feedstock variability:** Waste-derived fuels require robust quality control and reliable supply chains to maintain kiln performance (GCCA, 2024)
- **Policy and regulatory barriers:** Restrictions on waste co-processing, inconsistent permitting and limited incentives continue to constrain deployment (UNEP, 2023)

Lever 6. Electrification and renewable hydrogen

Electrification and renewable hydrogen can further reduce emissions from cement manufacturing by replacing fossil fuel combustion in selected processes and, over the longer term, providing near-zero emission heat for clinker production. The contribution of electrification and renewable hydrogen are expected to be smaller than that of CCUS, clinker substitution and material efficiency. However, they still represent important enabling technologies in long-term net-zero pathways (IEA, 2024; MPP, 2022).

Electrification is already used for auxiliary processes such as crushing, grinding and material handling, with further emissions reductions achievable through renewable electricity supplied via on-site generation or power purchase agreements. Pilot projects are also developing electrically heated kilns and plasma heating systems for clinker production (IEA, 2024; GCCA, 2024).

Renewable hydrogen is being explored as a replacement for fossil fuels in cement kilns. While pilot projects have demonstrated technical feasibility, its widespread use remains uncertain due to high costs and competing demand from other hard-to-abate sectors (MPP, 2022; IEA, 2024; Mineral Products Association, 2022).

Wider deployment faces several barriers:

- **Technology maturity:** Electrified clinker production and hydrogen-fired kilns remain at the pilot or demonstration stage (IEA, 2024).
- **High electricity and hydrogen costs:** Renewable electricity and green hydrogen remain more expensive than conventional fuels (MPP, 2022).
- **Infrastructure requirements:** Large-scale deployment requires major investment in renewable electricity, hydrogen production, transmission and storage infrastructure (IEA, 2024).
- **Competition for renewable energy resources:** Limited supplies of renewable electricity and green hydrogen may constrain availability and increase costs (IEA, 2024).

Policy recommendations

In situations where a country has already formalized a climate change act that legislates for a net-zero goal, this overarching policy will provide a strong contextual framework and mandate for setting these cement-related policies. Governments can demonstrate how a country's Nationally Determined Contribution (NDC) will be implemented and work with key stakeholders to develop industrial pathways to transition to net-zero emissions.

While the policy recommendations presented in this brief are broadly applicable across jurisdictions, their implementation and sequencing should reflect national circumstances, including:

- Stage of economic development;
- Projected cement demand;
- Availability of local limestone for clinker production vs imported clinker;
- Availability of SCMs;
- Access to renewable energy;
- Geological storage potential for CO₂;
- Whether new capacity is being built or existing plant requires retrofitting; and
- Institutional capacity.

Table 4 considers which policies may be more relevant to developed and emerging markets. Further considerations may include fiscal implications, with policies potentially comprising zero-cost regulatory reform, budget-neutral demand creation, revenue raising or dependent on subsidies.

Governments may also consider co-benefits of certain policies, such as reduced landfill, improved local air quality with connected health benefits, and reduced fuel or other imports with a balance of payments benefit.

In many emerging markets, priorities may include avoiding carbon lock-in through greater clinker substitution, performance-based standards and access to affordable finance. In more mature markets, policies increasingly focus on commercializing breakthrough technologies such as CCUS, creating demand for near-zero cement, and developing enabling CO₂ transport and storage infrastructure.

The transition to low-carbon cement production should be implemented in a way that supports workers, communities and regions that depend on the cement value chain. While decarbonization can create new employment opportunities, it may also require significant changes to existing industrial processes and skills.

Governments, industry, financial institutions and social partners should work together to anticipate transition impacts and support workforce reskilling, skills development and regional economic diversification where needed.

Integrating just transition principles into industrial and climate policies can help maintain public support, strengthen social outcomes and ensure that the benefits of cement decarbonization are shared broadly across society.

Table 4: Overview of cement decarbonization levers supported by policy recommendations

Policy areas	Main challenge addressed	Decarbonization levers supported	Policy recommendations	Developed markets priority	Emerging markets priority
1. Carbon pricing	Investment certainty	CCUS, fuel switching, electrification	1.1 Establish predictable carbon pricing frameworks	High	Medium
2. CCUS support	Large capital projects	CCUS	2.1 Develop shared CO ₂ transport and storage infrastructure	High	Medium
			2.2 Establish clear legal and regulatory frameworks for CCUS	Medium	Medium
3. Green procurement	Market demand	SCMs, alternative chemistries, concrete efficiency	3.1 Adopt low-carbon public procurement policies	High	Medium
			3.2 Require EPDs and standardized embodied-carbon disclosure	Medium	Medium
4. Building codes and standards	Technology adoption	SCMs, alternative chemistries, concrete efficiency	4.1 Adopt performance-based standards	High	High
			4.2 Approve low-clinker cements, SCMs, and alternative binders	Medium	High
5. Circular economy	Resource efficiency	Concrete efficiency, SCMs	5.1 Promote construction and demolition waste recovery and recycling	Medium	Medium
6. Financial incentives	FOAK investment	CCUS, hydrogen, alternative chemistries	6.1 Develop revenue-support mechanisms	Medium	Low
			6.2 Provide tax credits and grants for FOAK projects	Medium	High



1. Carbon pricing

Predictable and long-term carbon pricing is one of the most powerful economy-wide instruments for reducing industrial emissions. Internalizing the cost of carbon strengthens the business case for investing in lower-carbon cement production while encouraging innovation across the value chain.

1.1 Establish predictable carbon-pricing frameworks

Carbon pricing can accelerate investment in low-carbon cement production. By assigning a cost to GHG emissions, carbon pricing improves the competitiveness of lower-carbon production pathways. It also strengthens the business case for capital-intensive investments such as CCUS, alternative fuels and innovative cement technologies (IEA, 2024; GCCA, 2024).

To support long-term investment decisions, carbon pricing frameworks should provide clear and credible price signals while minimizing regulatory uncertainty. This can be achieved through emissions trading systems, carbon taxes or hybrid approaches, complemented by measures to reduce carbon leakage risks for emissions-intensive, trade-exposed industries (Organisation for Economic Co-operation and Development [OECD], 2023).

For banks, predictable carbon pricing improves the bankability of cement decarbonization projects by increasing revenue certainty and reducing transition risk. Stable policy frameworks enable banks to better assess borrowers' transition strategies and mobilize private capital towards the deployment of low-carbon cement technologies (MPP, 2022; IEA, 2024).

Policy actions

- **Establish long-term carbon pricing frameworks** with clear price trajectories, using mechanisms such as price floors or corridors

How banks can support

- **Advocate for stable and predictable carbon pricing** that improves investment certainty
- **Engage policymakers on policy designs** that strengthen project bankability

Table 5: Examples of carbon pricing frameworks

Country/region	Policy measures
European Union (EU)	The EU Emissions Trading System establishes a long-term carbon price for cement producers, encouraging investment in emissions reduction technologies while progressively tightening emissions caps.
Republic of Korea	The Korea Emissions Trading Scheme covers the cement sector and provides a market-based incentive for emissions reductions through tradable emissions allowances.

Note: The World Bank [Carbon Pricing Dashboard](#) includes a comprehensive overview of carbon pricing frameworks. **Sources:** European Commission, 2023; International Carbon Action Partnership, 2024



2. Carbon capture, utilization and storage support

CCUS will be essential to achieving net-zero emissions in the cement sector, as it is currently the only commercially available technology capable of addressing most process emissions from clinker production. Governments can play a critical role in enabling large-scale deployment by supporting the development of shared infrastructure and establishing clear legal and regulatory frameworks that reduce investment risk.

2.1 Develop shared CO₂ transport and storage infrastructure

The successful deployment of CCUS in the cement sector depends on the availability of reliable and cost-effective CO₂ transport and permanent storage infrastructure. While many cement plants are technically suitable for carbon capture, individual facilities are often unable to justify the significant investment required for dedicated pipelines or storage sites. Developing shared transport and storage networks can reduce costs through economies of scale, lower investment risks and enable multiple industrial facilities to access common CO₂ infrastructure (IEA, 2024; GCCA, 2024).

Governments have a critical role in supporting the development of CO₂ infrastructure through strategic planning, investments and regulatory frameworks that facilitate cross-sector and cross-border CO₂ transport and storage. Industrial clusters and shared infrastructure hubs can further improve project economics by connecting cement plants with other hard-to-abate industries, accelerating the commercialization of CCUS at scale (MPP, 2022; IPCC, 2022).

For banks, the availability of shared CO₂ transport and storage infrastructure significantly improves the bankability of CCUS projects by reducing capital costs, operational risks and infrastructure uncertainty. Well-developed CO₂ networks can increase investor confidence and unlock private financing for commercial-scale carbon capture projects across the cement sector (IEA, 2024; GCCA, 2024).

Policy actions
▪ Develop regional CO₂ transport and storage networks serving multiple industrial facilities ▪ Coordinate infrastructure planning across industrial clusters and jurisdictions
How banks can support
▪ Finance shared CO₂ transport and storage infrastructure ▪ Support public-private partnerships for regional CCUS hubs

Table 6: Examples of shared CO₂ transport and storage infrastructure

Country/region	Policy measures
Netherlands (Kingdom of the)	The Porthos project will provide shared CO ₂ transport and storage infrastructure for industries in the Port of Rotterdam, enabling industrial emitters to access permanent offshore CO ₂ storage.
Norway	The Longship project is developing an integrated CO ₂ transport and offshore storage network designed to serve multiple industrial facilities (including cement plants), thus reducing costs through shared assets.

Sources: Porthos, 2024; Norwegian Ministry of Energy, 2025

2.2 Establish clear legal and regulatory frameworks for CCUS

Clear and predictable legal and regulatory frameworks are essential to accelerate investment in CCUS across the cement sector. Uncertainty regarding permitting, CO₂ transport, long-term storage liability, monitoring requirements and third-party access to infrastructure can delay projects, increase financing costs and discourage private investment. Establishing comprehensive regulatory frameworks provides greater confidence that CCUS projects can be developed, operated and monitored safely over their full life cycle (IEA, 2024; IPCC, 2022).

Governments can support CCUS deployment by streamlining permitting processes, clarifying responsibilities for long-term stewardship of stored CO₂, establishing robust monitoring and verification requirements, enabling equitable access to shared transport and storage infrastructure, and taking on or sharing part of the project risk through appropriate financial, contractual or policy mechanisms. Harmonized regulatory frameworks can also facilitate cross-border CO₂ transport and storage, particularly in regions where suitable geological storage capacity is unevenly distributed (Global CCS Institute, 2024; IEA, 2024).

For banks, clear legal and regulatory frameworks reduce operational risks associated with CCUS projects, improving their bankability and investment attractiveness. Regulatory certainty enables banks to better assess long-term project viability and supports the mobilization of private capital for large-scale carbon capture infrastructure and cement decarbonization projects (IEA, 2024; Global CCS Institute, 2024).

Policy actions

- Establish clear permitting, monitoring and long-term liability frameworks for CO₂ storage
- Harmonize regulations governing cross-border CO₂ transport and storage

How banks can support

- Engage policymakers on regulatory frameworks that reduce investment risk

Table 7: Examples of legal and regulatory frameworks for CCUS

Country/ region	Policy measures
Norway	Norway has established one of the world’s most comprehensive legal frameworks for CO ₂ transport and storage, with clear rules governing permitting, monitoring, long-term stewardship and liability. This regulatory certainty has enabled commercial-scale projects such as Longship and Northern Lights, which, in turn, have provided open-access CO ₂ transport and storage infrastructure and created a model for large-scale industrial CCUS deployment.
United Kingdom of Great Britain and Northern Ireland	The UK has established a comprehensive regulatory framework for industrial CCUS through legislation governing CO ₂ transport, offshore storage and project licensing. It has also introduced dedicated business models and regulatory arrangements that provide long-term revenue certainty and support investment in shared CO ₂ infrastructure. In addition, the UK has enabled the development of industrial carbon capture clusters, such as the East Coast Cluster and HyNet.

Sources: Norwegian Offshore Directorate, 2024; UK Department for Energy Security and Net Zero, 2025



3. Green procurement

Public procurement can play a powerful role in creating demand for low-carbon cement and concrete, helping bridge the cost gap between conventional and lower-emission products. Public procurement policies should consider whole-life carbon at the building and infrastructure level, while using standardized embodied-carbon metrics to assess cement, concrete and other construction products. By incorporating embodied-carbon considerations into procurement decisions and promoting transparent emissions disclosure, governments can provide the long-term market signals needed to stimulate investment in low-carbon production. Strong demand-side policies can accelerate commercialization while improving the bankability of decarbonization projects.

3.1 Adopt low-carbon public procurement policies

Public procurement can play a pivotal role in accelerating demand for low-carbon cement by incorporating embodied-carbon criteria into the procurement of public buildings and infrastructure. Low-carbon policies require procuring entities to consider the life-cycle emissions of construction materials alongside traditional criteria such as cost and performance, thereby creating market demand for lower-carbon cement and concrete. By rewarding products with lower embodied emissions, these policies encourage investment in decarbonization measures such as clinker substitution, alternative fuels, material efficiency and CCUS (UNEP, 2023; OECD, 2023).

Governments can strengthen low-carbon programmes by adopting standardized methodologies for measuring embodied carbon, requiring environmental product declarations (EPDs), and progressively tightening emissions thresholds as low-carbon technologies mature. Harmonized standards and transparent reporting can improve market confidence while creating a level playing field for producers investing in lower-carbon cement production (GCCA, 2024; IEA, 2024).

For banks, these policies provide stronger and more predictable demand signals for low-carbon cement products, reducing market risk for producers investing in decarbonization technologies. In turn, this improved revenue certainty enhances the bankability of transition investments and supports the mobilization of private capital towards low-carbon cement manufacturing and construction projects (IEA, 2024; UNEP, 2023).

Policy actions

- **Introduce whole-life-carbon requirements** for publicly procured buildings and infrastructure
- **Progressively tighten embodied-carbon thresholds** as low-carbon technologies mature

How banks can support

- **Advocate for procurement policies that create long-term demand for low-carbon cement**
- **Support clients supplying low-carbon materials** to public infrastructure projects

Table 8: Examples of low-carbon public procurement policies

Country/region	Policy measures
Netherlands (Kingdom of the)	Public procurement policies increasingly require life-cycle carbon assessments for buildings and infrastructure, encouraging the use of lower-carbon construction materials through the Environmental Performance of Buildings framework.
United States of America	The Buy Clean California Act requires state agencies to consider the embodied carbon of selected construction materials, creating demand for lower-carbon cement and concrete products.

Sources: California Department of General Services, 2024; Dutch National Government, 2026

3.2 Require environmental product declarations and standardized embodied-carbon disclosure

EPDs and standardized embodied-carbon disclosure are essential for creating transparent and credible markets for low-carbon cement and concrete. The former provide independently verified information on the life-cycle GHG emissions and other environmental impacts of construction materials, thus enabling purchasers, designers and investors to compare products on a consistent basis. Standardized disclosure improves market transparency, supports the implementation of embodied-carbon procurement policies and provides the data needed to reward producers that invest in lower-carbon production technologies (UNEP, 2023; GCCA, 2024).

Governments can accelerate market adoption by requiring standardized EPDs for construction materials used in public projects, harmonizing product category rules and life-cycle assessment methodologies, and developing national databases that improve the accessibility and comparability of embodied-carbon data. Aligning disclosure requirements across jurisdictions can reduce reporting burdens while facilitating international trade in low-carbon construction materials (IEA, 2024; World Green Building Council, 2023).

For financial institutions, standardized embodied-carbon disclosure improves the assessment of transition risks and opportunities by providing comparable data on the carbon intensity of cement and concrete products. Reliable EPDs enable banks to better evaluate borrowers’ decarbonization strategies, identify lower-carbon investments and incorporate product-level emissions performance into sustainable finance and transition finance decision-making (UNEP, 2023; GCCA, 2024).

Policy actions

- **Require standardized Environmental Product Declarations for cement and concrete** used in public procurement and major construction projects
- **Develop national embodied-carbon databases and digital reporting platforms**

How banks can support

- **Advocate for harmonized embodied-carbon disclosure standards** that improve market transparency and investment decision-making
- **Encourage clients to develop verified Environmental Product Declarations and disclose product-level embodied-carbon data**

Table 9: Examples of environmental product declarations and standardized embodied-carbon disclosure

Country/region	Policy measures
Singapore	Singapore encourages the use of verified EPDs and whole-life carbon assessments for construction materials under its Building and Construction Authority Green Mark scheme. These requirements improve embodied-carbon transparency, support sustainable procurement decisions, and help developers identify lower-carbon cement and concrete products for new developments.
United States of America	The Buy Clean California Act requires EPDs for selected structural materials (e.g. cement and steel) used in state-funded infrastructure projects. The programme uses standardized embodied-carbon data and creates transparent market signals for lower-carbon materials.

Sources: Building and Construction Authority Singapore, 2024; State of California Department of General Services, 2024

4. Building codes and standards



Building codes, cement standards and product approval processes have a significant influence on the pace of innovation in the cement sector. Many existing standards were developed around conventional Portland cement and can unintentionally limit the deployment of lower-carbon materials and technologies. Modernizing regulatory frameworks to focus on performance rather than prescriptive specifications can accelerate innovation while maintaining safety, durability and structural performance.

4.1 Adopt performance-based standards

Performance-based standards can accelerate the adoption of low-carbon cement by evaluating construction materials based on their required performance rather than prescribing specific material compositions or production methods. In many jurisdictions, building codes and cement standards specify minimum clinker content or restrict the use of innovative cement formulations, thus limiting the deployment of SCMs, alternative binders and other low-carbon technologies. In contrast, performance-based approaches enable producers to innovate and adopt lower-carbon solutions while ensuring that concrete continues to meet required standards for strength, durability and safety (IEA, 2024; UNEP, 2023).

Governments and standards organizations can facilitate this transition by updating building codes and technical standards to focus on functional performance, and by harmonizing testing and certification procedures for innovative cement products. This can reduce regulatory barriers, accelerate market adoption of low-carbon materials and encourage continued innovation across the cement value chain (GCCA, 2024; MPP, 2022).

For banks, performance-based standards reduce regulatory uncertainty and create clearer market opportunities for low-carbon cement technologies. By enabling wider commercial adoption of innovative products, these standards improve the bankability of investments in clinker substitution, alternative cement chemistries and other decarbonization technologies. In so doing, they support the mobilization of private capital towards the sector’s transition (IEA, 2024; UNEP, 2023).

Policy actions

- **Update building codes to prioritize material performance** rather than prescriptive compositions
- **Encourage the use of life-cycle emissions** alongside traditional performance criteria

How banks can support

- **Advocate for standards that enable commercially viable, low-carbon technologies**

Table 10: Examples of performance-based standards

Country/region	Policy measures
Australia	Australia’s National Construction Code and associated standards support performance-based approaches that facilitate innovation in lower-carbon concrete technologies.
United States of America	Performance-based concrete specifications set by the standards body, ASTM, provide flexibility for producers to optimize concrete mixtures and increase the use of lower-carbon cementitious materials.

Sources: Australian Building Codes Board, 2025, GCCA, 2025

4.2 Approve low-clinker cements, SCMs, and alternative binders

Many low-carbon cement technologies are already technically proven but face regulatory barriers that limit their commercial deployment. In many jurisdictions, cement standards and approval processes were developed around conventional Portland cement and have not kept pace with innovations such as low-clinker cements, SCMs and alternative binders. Lengthy approval procedures and inconsistent national standards can delay market entry, increase costs and discourage investment in lower-carbon cement products (IEA, 2024; UNEP, 2023).

Governments and standards bodies can accelerate the uptake of these technologies by modernizing product approval processes (without impacting safety requirements), harmonizing technical standards and expanding the range of approved low-carbon cement formulations. Risk-based and science-based approval procedures, supported by robust testing and performance data, can facilitate the safe and timely commercialization of innovative cement products while maintaining high standards for structural performance and durability (GCCA, 2024; MPP, 2022).

For banks, greater regulatory acceptance of low-clinker cements, SCMs and alternative binders strengthens the commercial viability of investments in low-carbon cement production. It also helps mobilize private capital towards technologies that can deliver immediate emissions reductions across the sector (IEA, 2024; UNEP, 2023).

Policy actions

- **Streamline approval processes for low-carbon cement technologies**
- **Harmonize national standards** governing SCMs and alternative binders

How banks can support

- **Engage policymakers on reducing regulatory barriers to commercialization**

Table 11: Examples of low-clinker cements, SCMs and alternative binders

Country/region	Policy measures
European Union	The EN 197-5 cement standard expands the range of approved low-clinker cement types, facilitating the commercialization of innovative blended cements with lower embodied emissions.
India	National cement standards support widespread production and use of blended cements containing fly ash and slag, making India one of the world's largest users of supplementary cementitious materials.

Sources: Bureau of Indian Standards, 2018; European Committee for Standardization, 2021



5. Circular economy

Circular economy policies can reduce emissions from the cement sector by extending the life of construction materials as well as increasing the recovery and reuse of valuable materials. Greater circularity can reduce demand for virgin raw materials, lower life-cycle emissions and create new markets for recycled products. Governments can support this transition by strengthening waste recovery policies, investing in recycling infrastructure and promoting the use of secondary materials in construction.

5.1 Promote construction and demolition waste recovery and recycling

Promoting the recovery and recycling of construction and demolition waste can reduce the cement sector's emissions by supporting more efficient use of materials and expanding the availability of recycled construction products. Recovered concrete can be processed into recycled aggregates, while advances in material recovery technologies enable the production of recycled cementitious materials that partially replace clinker in new cement (UNEP, 2023; IEA, 2024).

In addition, where recycling is not technically or economically feasible, suitable pretreated construction and demolition waste and other non-recyclable waste streams can be co-processed in cement kilns to recover energy and minerals. Doing so displaces fossil fuels and virgin raw materials. Integrating co-processing into waste management and circular economy strategies can therefore reduce landfill, lower life-cycle emissions and create new markets for recovered materials.

Governments can accelerate circularity by establishing policies and targets for construction and demolition waste recovery, investing in recycling infrastructure, introducing landfill restrictions for recoverable materials and adopting quality standards that facilitate the use of recycled aggregates and recycled cementitious materials in construction. Public procurement policies can further stimulate demand by encouraging or requiring the use of recycled materials in public infrastructure projects (GCCA, 2024; MPP, 2022).

For banks, stronger construction and demolition waste recovery policies create new investment opportunities across the circular construction value chain, including recycling facilities, material recovery technologies and secondary materials markets. Expanding the supply and use of recycled construction materials can improve resource efficiency, reduce life-cycle emissions and strengthen the commercial viability of circular economy investments in the cement sector (IEA, 2024; UNEP, 2023).

Policy actions

- Invest in recycling and material recovery infrastructure
- Encourage the use of recycled construction materials through public procurement

How banks can support

- Finance recycling infrastructure and circular construction projects
- Promote circular economy principles through client engagement

Table 12: Examples of construction and demolition waste recovery and recycling

Country/region	Policy measures
Japan	The Construction Material Recycling Law requires the separation and recycling of key construction materials from demolition projects, supporting high recovery rates and efficient resource use.
Netherlands (Kingdom of the)	National circular economy policies have resulted in some of the world's highest construction waste recovery rates through strong recycling markets and quality standards for recycled materials.

Sources: Government of the Netherlands, 2023; Japan Ministry of Land, Infrastructure, Transport and Tourism, 2024



6. Financial incentives

Many of the technologies required to decarbonize the cement sector are commercially available but remain more expensive than conventional production methods, particularly during early deployment. Targeted financial incentives can help overcome these cost barriers by reducing investment risk, improving project economics and accelerating technology commercialization. Well-designed public support mechanisms can catalyse private investment and mobilize the capital needed to scale low-carbon cement production.

6.1 Develop revenue-support mechanisms

Revenue-support mechanisms can help bridge the cost gap between conventional and low-carbon cement production by providing greater revenue certainty for investments in emerging decarbonization technologies. Technologies such as CCUS, alternative cement chemistries and renewable hydrogen often face higher production costs and uncertain market demand, making it difficult to secure commercial financing. Mechanisms such as contracts for difference and production-based incentives can reduce market risk by guaranteeing a predictable revenue stream for verified emissions reductions or low-carbon products (IEA, 2024; OECD, 2023).

Governments can accelerate investment by implementing technology-neutral and transparent revenue-support schemes that reward emissions reductions while encouraging competition and cost reductions over time. Well-designed mechanisms should provide long-term policy certainty, establish clear eligibility criteria, and complement carbon pricing and public procurement policies to create stable market conditions for low-carbon cement production (MPP, 2022; GCCA, 2024). A mechanism to incentivise low-emission cement production similar to the corporate average fuel economy (CAFE) standards used in the automotive industry is one potential option that could be explored.

For banks, revenue-support mechanisms improve the bankability of low-carbon cement projects by reducing revenue uncertainty and strengthening project cash flows. Greater investment certainty lowers financing risks, facilitates access to commercial debt and helps mobilize private capital for FOAK projects that are essential to scaling the technologies needed to achieve net-zero emissions in the cement sector (IEA, 2024; OECD, 2023).

Policy actions

- **introduce contracts for difference for low-carbon cement**
- **Establish long-term and transparent revenue-support schemes** for emerging technologies

How banks can support

- **engage policymakers on revenue mechanisms** that improve project bankability
- **Structure financing around long-term revenue support arrangements**

Table 13: Examples of revenue-support mechanisms

Country/region	Policy measures
Germany	Germany is implementing Carbon Contracts for Difference to provide long-term revenue certainty for industrial decarbonization projects by compensating the cost difference between conventional and low-carbon production.
United Kingdom of Great Britain and Northern Ireland	The UK has developed industrial carbon capture business models that provide revenue support for CO ₂ transport and storage, reducing investment risks for CCUS projects.

Sources: German Federal Ministry for Economic Affairs and Climate Action, 2024; UK Department for Energy Security and Net Zero, 2024

6.2 Provide tax credits and grants for first-of-a-kind projects

First-of-a-kind (FOAK) projects are essential for demonstrating and commercializing the technologies needed to decarbonize the cement sector, including CCUS, alternative cement chemistries and electrified production processes. However, these projects typically face higher capital costs and technology risks than conventional investments as well as greater financing challenges. Targeted tax credits and grants can help bridge the funding gap, reduce upfront investment costs and accelerate the deployment of innovative low-carbon technologies (IEA, 2024; MPP, 2022).

Governments can support FOAK projects by providing capital grants, investment tax credits and funding for demonstration and early commercial-scale facilities. Well-designed programmes should prioritize technologies with strong emissions reduction potential while encouraging knowledge-sharing and cost reductions that facilitate wider market adoption. Public support can also help attract private investment by reducing project risks and improving commercial viability (GCCA, 2024; OECD, 2023).

For banks, tax credits and grants enhance the bankability of FOAK projects by lowering capital requirements, improving project economics and reducing technology-related risks. Public funding can catalyse private investment by increasing investor confidence and enabling commercial lenders to finance innovative projects that are critical to scaling the next generation of low-carbon cement technologies (IEA, 2024; MPP, 2022).

Beyond public incentives, banks can deploy financing without policy change. For example, concessional and blended structures with development finance institutions can absorb early-stage risk. Sustainability-linked facilities can use clinker-to-cement ratio or thermal substitution rate as key performance indicators. Further, corporate power purchase agreements for on-site renewables can secure renewable electricity and reduce Scope 2 emissions. These structures let banks support credible transition pathways while advocating for longer-term policy reform.

Policy actions

- Provide competitive grants and investment tax credits for first-of-a-kind projects
- Support pilot, demonstration and early commercial deployment of innovative technologies

How banks can support

- Engage policymakers on programme designs that attract private investment
- Provide bridge financing against approved grants or tax credits

Table 14: Examples of tax credits and grants for first-of-a-kind projects

Country/region	Policy measures
Canada	Canada's Investment Tax Credit for Carbon Capture, Utilization and Storage provides substantial support for eligible capital investments in CCUS infrastructure and industrial decarbonization projects.
European Union	The EU's Innovation Fund provides grants to support FOAK industrial decarbonization projects, helping innovative cement technologies progress from demonstration to commercial deployment.

Sources: European Commission, 2024; Government of Canada, 2024

**Emerging
initiatives**

Book-and-claim mechanisms

Book-and-claim mechanisms are emerging as market-based approaches that could help accelerate investment in low-carbon cement by decoupling the physical delivery of cement from its environmental attributes. Under this model, producers generate verified environmental attribute certificates representing the emissions reductions achieved through measures to reduce GHG emissions. These certificates can be purchased independently of the physical cement, allowing organizations to financially support low-carbon production even when they cannot directly procure lower-carbon cement due to localized supply chains (RMI, 2026; World Business Council for Sustainable Development, 2024).

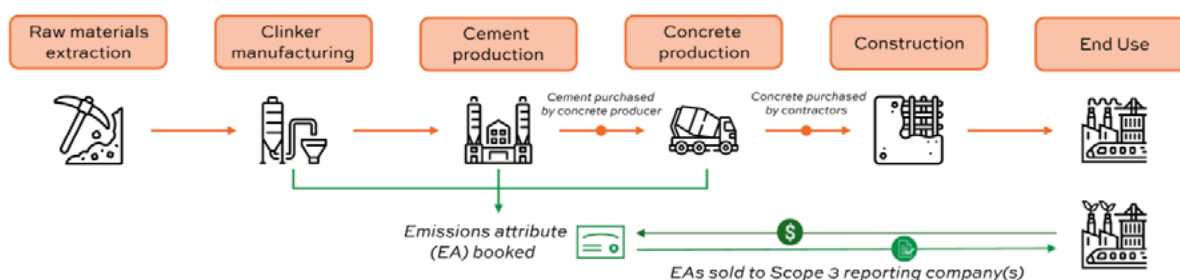


Figure 3: Illustrative representation of book and claim for the cement sector (RMI, 2026)

Building on successful applications in renewable electricity and sustainable aviation fuel, several organizations are developing book-and-claim frameworks tailored to the cement and concrete sector. The non-profit RMI, together with the Center for Green Market Activation, has developed a framework based on environmental attribute certificates, transparent registries and robust accounting principles to enable credible transactions while ensuring environmental integrity and preventing double counting (RMI, 2026).

In parallel, GCCA is developing a sector-wide book-and-claim scheme that uses digital product certificates to aggregate geographically dispersed demand and create additional revenue streams for low-carbon cement producers (GCCA, 2026).

Although both initiatives remain under development, they demonstrate the growing industry consensus that book-and-claim mechanisms can complement public procurement and other demand-side policies by mobilizing private capital and accelerating investment in low-carbon cement production. These mechanisms can take advantage of distributed demand for low-carbon cement which is insufficiently concentrated to support a low-carbon cement facility, given that cement is normally used relatively local to production.

Nature-based solutions

Nature-based solutions are increasingly being recognized as a complementary approach to reducing the environmental footprint of the cement and concrete sector while enhancing climate resilience and biodiversity. Although nature-based solutions do not directly reduce process emissions from cement production, they can contribute to broader sustainability objectives through quarry rehabilitation, ecosystem restoration and the integration of green infrastructure into the built environment. Examples include restoring degraded quarry sites, creating wetlands and wildlife habitats, and incorporating permeable concrete, green roofs and other nature-integrated infrastructure that improve water management, reduce the effects of urban heat islands and enhance biodiversity (GCCA, 2024).

Conclusion

The cement sector is indispensable to economic development, urbanization and the global energy transition. At the same time, it is one of the most challenging sectors to decarbonize due to process emissions from clinker production, long-lived assets and the capital-intensive nature of production.

The sector has made important progress through improved energy efficiency, greater use of alternative fuels and increased clinker substitution. That said, achieving net-zero emissions by 2050 will require the large-scale deployment of multiple complementary decarbonization levers. No single technology will be sufficient. Instead, the transition will depend on:

- Scaling CCUS;
- Maximizing the use of SCMs;
- Improving material efficiency;
- Commercializing alternative cement chemistries;
- Increasing the use of low-carbon electricity and hydrogen; and
- Adopting more circular approaches to construction and demolition materials.

Although many of these technologies are technically proven, widespread deployment continues to be constrained by high capital costs, uncertain demand for low-carbon cement, fragmented regulatory frameworks and limited enabling infrastructure. These barriers cannot be overcome by industry or financial institutions alone.

Governments have a critical role in creating the enabling conditions that reduce investment risk, establish long-term market certainty and accelerate technology commercialization. Predictable carbon pricing, targeted public procurement, revenue-support mechanisms, streamlined product approvals, harmonized embodied-carbon disclosure, investment incentives, and shared CO₂ transport and storage infrastructure will all be essential to mobilize the scale of investment required. In parallel to decarbonizing the cement sector, governments are encouraged to promote low-carbon alternatives to cement such as wood and timber (where appropriate), while encouraging whole-life carbon assessments to determine the most suitable material for each application.

Banks are equally important enablers of the transition. Beyond financing individual projects, they can help shape the policy environment by engaging constructively with governments and industry stakeholders to promote policies that improve project bankability, reduce regulatory uncertainty and unlock private investment. Banks can also integrate emerging policy developments into their transition finance strategies, support clients developing credible transition plans, and mobilize capital towards technologies and business models aligned with a net-zero cement sector.

This policy briefing note has highlighted the principal decarbonization levers and enabling policies that can support this transition. While **the optimal policy mix will differ across jurisdictions depending on resource availability, industrial structure and stage of economic development**, the direction of travel is clear: coordinated policy action and financial sector engagement will be essential to transform one of the world's most emissions-intensive industries.

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UN 
**environment
programme**

**finance
initiative**

UNEP Finance Initiative brings together a large network of banks, insurers and investors that catalyzes action across the financial system to deliver more sustainable global economies.

For more than 30 years the Initiative has been connecting the UN with financial institutions from around the world to shape the sustainable finance agenda. We've established the world's foremost sustainability frameworks, helping the finance industry achieve sustainability goals, address sustainability risks and identify the business opportunities in taking a responsible approach to banking and insurance.

Convened by a Geneva, Switzerland-based secretariat, more than 550 banks and insurers are individually implementing UNEP FI's Principles for Responsible Banking and Principles for Sustainable Insurance. Financial institutions work with UNEP FI on a voluntary basis to apply these industry frameworks and

develop practical guidance and tools that drive institutional change, shaping the future of sustainable finance and positioning their businesses for the transition to a sustainable and inclusive economy. In parallel, UNEP FI also drives systems change and fosters enabling conditions in service of the broader mission to mobilize and align private finance to help achieve the UN Sustainable Development Goals.

Founded in 1992, UNEP FI was the first organization to engage the finance sector on sustainability and incubated the Principles for Responsible Investment, now the world's leading proponent of responsible investment.

Today, we cultivate leadership and advance sustainable market practice while supporting the implementation of global programmes at a regional level across Africa & the Middle East, Asia Pacific, Europe, Latin America & the Caribbean, and North America.

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UN Environment Programme Finance Initiative