



Overview

Cement and concrete:

Priority actions towards a nature-positive future

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Introduction

As the second most consumed material in the world after water, and with no scalable substitutes currently available, concrete is a critical construction material and building block of the global economy. With the global urbanization rate projected to reach 68% by 2050,ⁱ concrete production and its key input, cement, are expected to continue expanding to meet the demand for commercial and residential buildings as well as public infrastructure.ⁱ Consequently, it is imperative for cement and concrete producers to continue accelerating their journey towards nature-positive practices and net-zero, to ensure the sector operates within the safe and just Earth system boundaries.ⁱⁱ

In some jurisdictions, companies in the sector already operate under stringent regulatory frameworks.ⁱⁱⁱ For example, in the European Union, they must implement mandatory quarry rehabilitation plans, air emission controls, and rigorous waste management practices. At the same time, corporate leaders have implemented water conservation plans, developed circularity strategies and worked with conservation organizations on quarry rehabilitation and nature restoration.^{iv} These efforts have been facilitated by the establishment of sectoral sustainability initiatives, such as the efforts of the Global Cement and Concrete Association (GCCA), whose members represent 80% of the global cement industry's volume outside of China. For example, the GCCA has introduced the [GCCA Sustainability Charter and](#)

[Guidelines, a strategic plan to achieve Net-Zero in the sector^v](#) and a [biodiversity policy](#).

While these efforts are welcome, more needs to be done. The sector continues to contribute to drivers of nature loss such as greenhouse gas emissions, freshwater withdrawal and ecosystem disturbance due to quarrying activities.^{vi} Moreover, regulators will soon begin to seek nature-related disclosure from companies.

To complement ongoing sustainability initiatives, all businesses need to **Assess, Commit, Transform, and Disclose** ([ACT-D high-level business actions on nature](#)). They should acknowledge the value of nature to their business; assess and measure their impacts and dependencies on nature; set transparent, time-bound, science-based targets; take actions to address their key impacts and dependencies; and publicly disclose performance and other relevant nature-related information.

This overview provides a sector-level summary of potential key impacts and dependencies on nature.^{vii} Importantly, it also sets out the priority actions that all businesses should take now to **transform** and ensure the cement and concrete sector plays its role in halting and reversing nature loss by 2030 - the mission at the heart of the [Kunming-Montreal Global Biodiversity Framework](#).

Scope of this overview

This overview focuses on cement and concrete companies as a sub-sector of the construction material sector ([SICS code: EM.2](#)). This covers activities including the upstream sourcing of raw materials and feedstocks, the midstream manufacture of cement and concrete as well as associated materials (such as clinker) and the downstream disposal and recycling of applicable construction materials, especially concrete debris. However, this overview does not analyze the downstream construction process and use phase of buildings. For further guidance on these activities, please refer to the World Business Council for Sustainable Development (WBCSD) report on the [built environment](#).

ⁱ It is forecasted that the total need for concrete through to 2050, assuming current practice will increase from currently around 14.0bn m3 of concrete to approximately 20bn m3 in 2050. See [Concrete Future: The GCCA 2050 Cement and Concrete Industry Roadmap for Net Zero Concrete](#) (GCCA, 2021).

ⁱⁱ In May 2023, the Earth Commission published the first quantification of safe and just Earth system boundaries, developed by more than 40 researchers across the globe. See [Safe and just Earth system boundaries](#) (Nature, 2023).

ⁱⁱⁱ Examples include the [hazardous air pollutants standards in the US](#), the [recycled concrete policy in Switzerland](#), the [EU taxonomy on cement](#), and [carbon emission regulation for cement in China](#), among others.

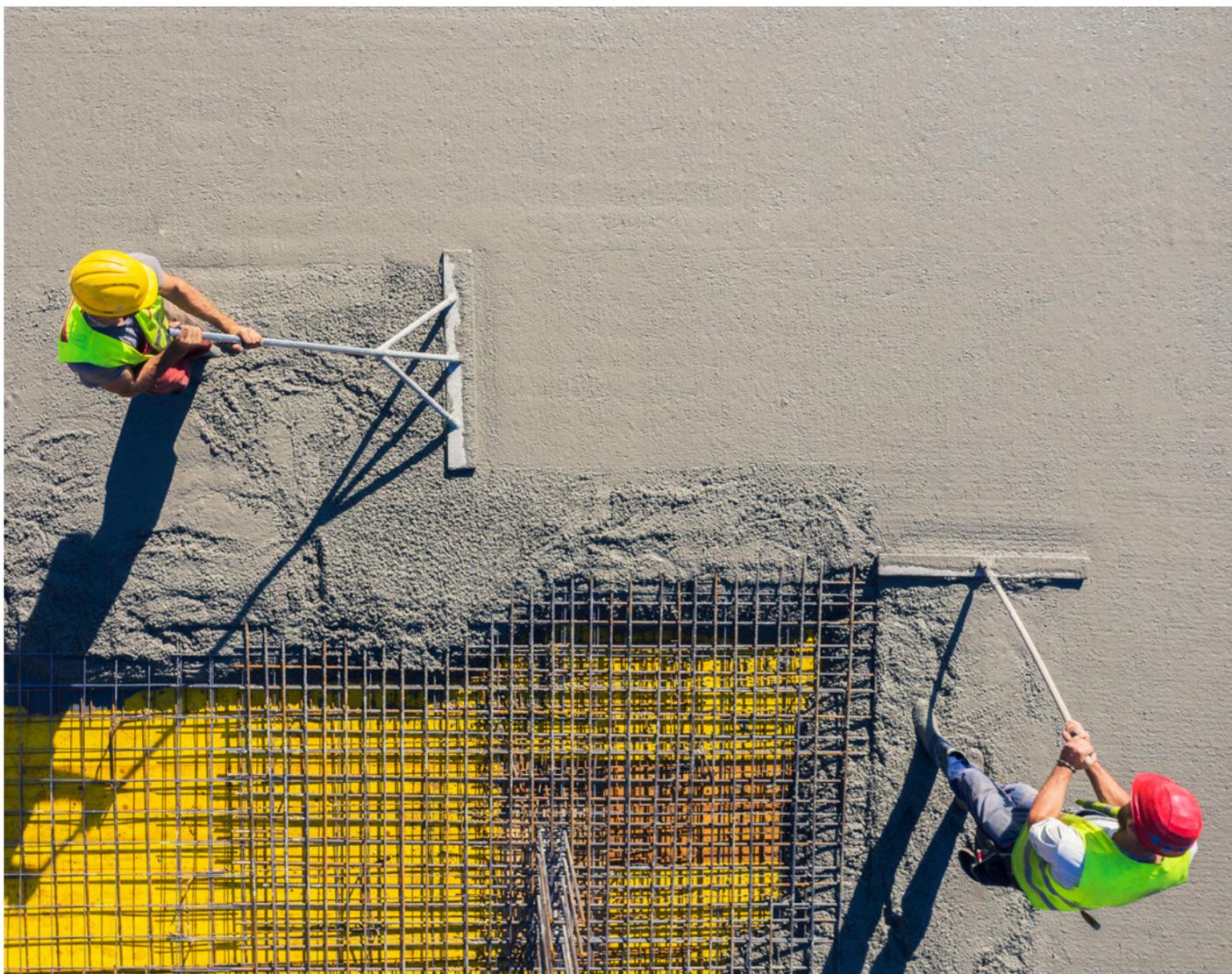
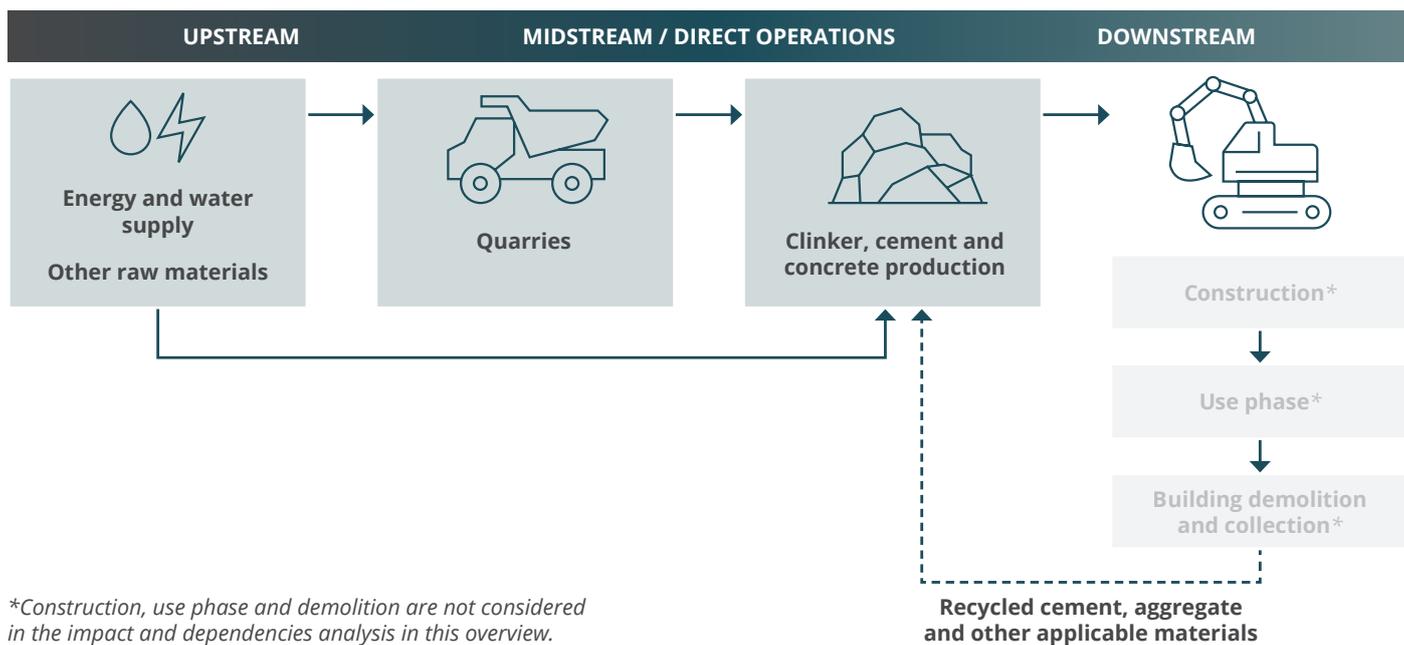
^{iv} Companies that have defined net-zero targets and made commitments on biodiversity include Holcim, Cemex, Siam Cement Group, among others. For more details, see full WEF report on the transition of the cement and concrete sector.

^v In 2021, the GCCA released the [2050 Cement and Concrete Industry Roadmap for Net Zero Concrete](#), highlighting a significant acceleration of the sector's decarbonization measure.

^{vi} Five key drivers of nature loss identified by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) Global Assessment Report.

^{vii} Analysis is mainly based on ENCORE and the SBTN Sectoral Materiality Tool. Other sources include: CDP Water Watch, WWF Water Risk Filter and Biodiversity Risk Filter, extensive desk research, academic reviews, company-specific insights and assessments, analysis by Oliver Wyman and Oliver Wyman 3D Carbon Accounting, analysis by the World Economic Forum, and the World Economic Forum into the processes and sectors, and industry expert interviews. The terminology on impacts and dependencies is aligned with [TNFD impact driver and dependencies categories](#).

Cement and concrete value chain (as covered in this overview)



Nature-related impacts

To protect and enhance the ecosystems on which they depend, businesses in the cement and concrete sector should direct their efforts towards addressing the most significant impacts on nature in their operations and value chains, namely:

- **Freshwater use and use of other resources** – The sector withdraws water across its entire value chain. Most water withdrawal occurs during the midstream production of clinker, cement and concrete. In particular, water is used for cooling equipment and exhaust gases, the washing of crushed rock, sand and gravel, and the manufacture of concrete. While other activities, such as agriculture, demand even more water, concrete production alone is responsible for 9% of global industrial water withdrawal, or 1.7% of total global water withdrawal.^{viii,2}

The industry also uses non-renewable natural resources to provide the materials required to manufacture cement, primarily limestone, shale and clay, and to produce concrete, such as hard crushed rock, sand and gravel — known collectively as aggregate. Annual global aggregate production is currently estimated at 40 billion to 45 billion tons, with more than 50 billion tons of sand being extracted globally each year.^{3,4}

- **Land use change and ecosystem disturbance** – Although many companies are taking action to implement quarry rehabilitation and biodiversity management plans, quarrying activities continue to have a negative impact on local ecosystems and habitats.

When improperly managed, dredging and coastal sand mining practices result in critical habitat destruction, sediment suspension and loss of biodiversity. This is particularly prevalent in parts of Asia.⁵

- **Greenhouse gas (GHG) emissions and air pollution** – Cement production is responsible for around 7% to 8% of global CO₂ emissions, primarily because of the chemical and thermal combustion processes involved in the production of clinker— an intermediate product in cement manufacture.⁶ The sector also contributes to air pollution through the release of harmful emissions, such as sulfur dioxide or nitrogen oxide, particularly in countries where there is weak regulation and/or enforcement.

Nature-related dependencies

Like many other sectors, the cement and concrete sector relies on freshwater for a range of activities related to the processing and manufacturing of clinker and cement. Moreover, water is a key ingredient of concrete.

This dependency strengthens the business case for investing in the protection and restoration of nature.



^{viii} The agricultural sector accounts for about 70% of all freshwater withdrawals globally. See [Water in Agriculture overview](#) (The World Bank).

Priority actions and opportunities

To reduce the sector's negative impacts on nature while mitigating risks to their operations and unlocking commercial opportunities, cement and concrete companies should prioritize five key actions:

1. Improve water stewardship across the value chain –

Reduce freshwater use and impact on water quality, especially in regions facing water risks. Levers include conducting water audits, setting up sustainable water management plans^{ix} and replacing freshwater with non-freshwater sources such as harvested rainwater. Closed-loop recycling systems at production sites and artificial wetlands can also reduce water withdrawal and improve water quality.

2. Adopt technologies and manufacturing practices to reduce greenhouse gas (GHG) and airborne emissions –

Accelerate ongoing efforts to reduce GHG and other emissions by switching to renewable energy sources (including sustainable alternative fuels), developing and introducing substitutions for carbon-intensive clinker, retrofitting facilities with emission-reducing technologies (such as Carbon Capture, Utilization, and Storage (CCUS)) and investing over the long term in innovative technologies (such as green hydrogen and kiln electrification). Enabling policies, supporting infrastructure and multi-stakeholder collaboration are critical for companies to successfully implement these measures.

3. Continue and strengthen reclamation and rehabilitation approaches as well as biodiversity management of quarries and improve land stewardship on all occupied land –

Consider biodiversity management and rehabilitation programs for both operational and inactive quarries. This supports species recovery and the restoration of degraded habitats. In new quarries, the positive impact on biodiversity can be measured using tools such as the Biodiversity Indicator and Reporting System (BIRS) by the International Union for Conservation of Nature (IUCN). Engage with environmental organizations, such as the IUCN, Fauna & Flora International (FFI), or BirdLife International, to develop biodiversity management standards and guidance to influence the whole sector. Implement biodiversity management on all occupied areas of land, including offices, plants and storage yards, particularly when sites are located in regions rich in biodiversity.

4. Expand circularity efforts across the value chain –

Expand existing circularity efforts (such as “co-processing” in kilns, which involves recovering energy from waste with careful control of airborne emission required), for example, by recycling entire concrete elements and structures. Construction and demolition waste can be reused as aggregate and, with evolving standards and policies, in other valuable applications. Carbon dioxide emissions can also be captured and recirculated in the value chain and water can be reused. With supporting policies, good initial planning and design of buildings, thoughtful renovations and demolitions and careful lifecycle analysis of the environmental impact, the potential of circularity in the built environment can be fully captured.

5. Innovate to offer products that support the transition to nature positive –

Change the feedstocks needed for cement production to more sustainable materials using cement additives such as slags, fly ash and pozzolans. Product and service portfolios can be expanded to introduce new offerings, especially downstream, such as waste management solutions to process and recycle waste. Partnerships with green building councils, construction engineering companies, architects and other stakeholders to improve the design of buildings and encourage the use of nature-enhancing products are equally crucial. New products can also contribute to Nature-based Solutions, such as using concrete in coral reef restoration following a careful analysis of the benefits and impacts.

Importantly, efforts to deliver these priority actions and transform the sector must be delivered in alignment with a just and equitable transition, including meaningful dialogue with affected groups, such as employees, local communities, Indigenous Peoples and marginalized communities

Adopting the priority actions can help businesses contribute to societal and environmental objectives, including the Global Biodiversity Framework (GBF) and the Sustainable Development Goals (SDGs). [Read the GBF-SDG mapping to see how the priority actions can contribute to these objectives.](#)



^{ix} Companies can leverage existing and emerging guidance and tools. For example, the GGCA provides guidance on how companies can monitor their water withdrawal and is also developing a water positivity tool, which will allow for a calculation of a production site's water credit-to-debit ratio.

Resources

This overview was derived from the report World Economic Forum's report [Nature Positive: Role of the Cement and Concrete Sector \(2023\)](#).

The following **sector-specific analysis, guidance, and tools** are currently available to companies in the cement and concrete sector:

- [GCCA Sustainability Guidelines](#) (Monitoring and reporting of emissions from cement manufacturing; Co-processing fuels and raw materials; Monitoring and reporting of water in cement manufacturing; Quarry rehabilitation and biodiversity management; Monitoring and reporting of CO2 emissions from cement manufacturing; Reducing and Controlling Emissions of Mercury Compounds in the Cement Industry)*
- [Concrete Future: The GCCA 2050 Roadmap for Net Zero Carbon Concrete](#) (GCCA, 2020)

- [The circular cement value chain: Sustainable and profitable](#) (World Economic Forum)
- [Extractive Sector Species Protection Code of Conduct: A manageable approach for planning and permitting procedures respecting EU legislation and fostering biodiversity](#) (BirdLife International & EU Mineral Extraction Associations, 2021)
- [Biodiversity Indicator and Reporting System \(BIRS\)](#) and [Integrated Biodiversity Management System \(IBMS\)](#) guidelines (IUCN, 2014)
- [Methodology for the Net Impact Assessment](#) (WBCSD, 2018)

For additional **sector-agnostic resources**, please refer to Business for Nature's [High-level Business Actions on Nature](#).

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References

¹ [Urbanization](#) (Our World in Data, 2018)

² [Impacts of booming concrete production on water resources worldwide](#) (Nature Sustainability, 2018)

³ [Growing global aggregates sustainably](#) (Aggregates Business, 2018)

⁴ [Sand and Sustainability: 10 strategic recommendations to avert a crisis](#) (United Nations Environment Programme, 2022)

⁵ [The Sands are Running Out](#) (World Wildlife Fund, 2018)

⁶ [Making Concrete Change: Innovation in Low-carbon Cement and Concrete](#) (Chatham House, 2018); [GCCA data](#)



* The work carried out by the Cement Sustainability Initiative (CSI) was transferred from WBCSD to the GCCA on 1 January 2019.