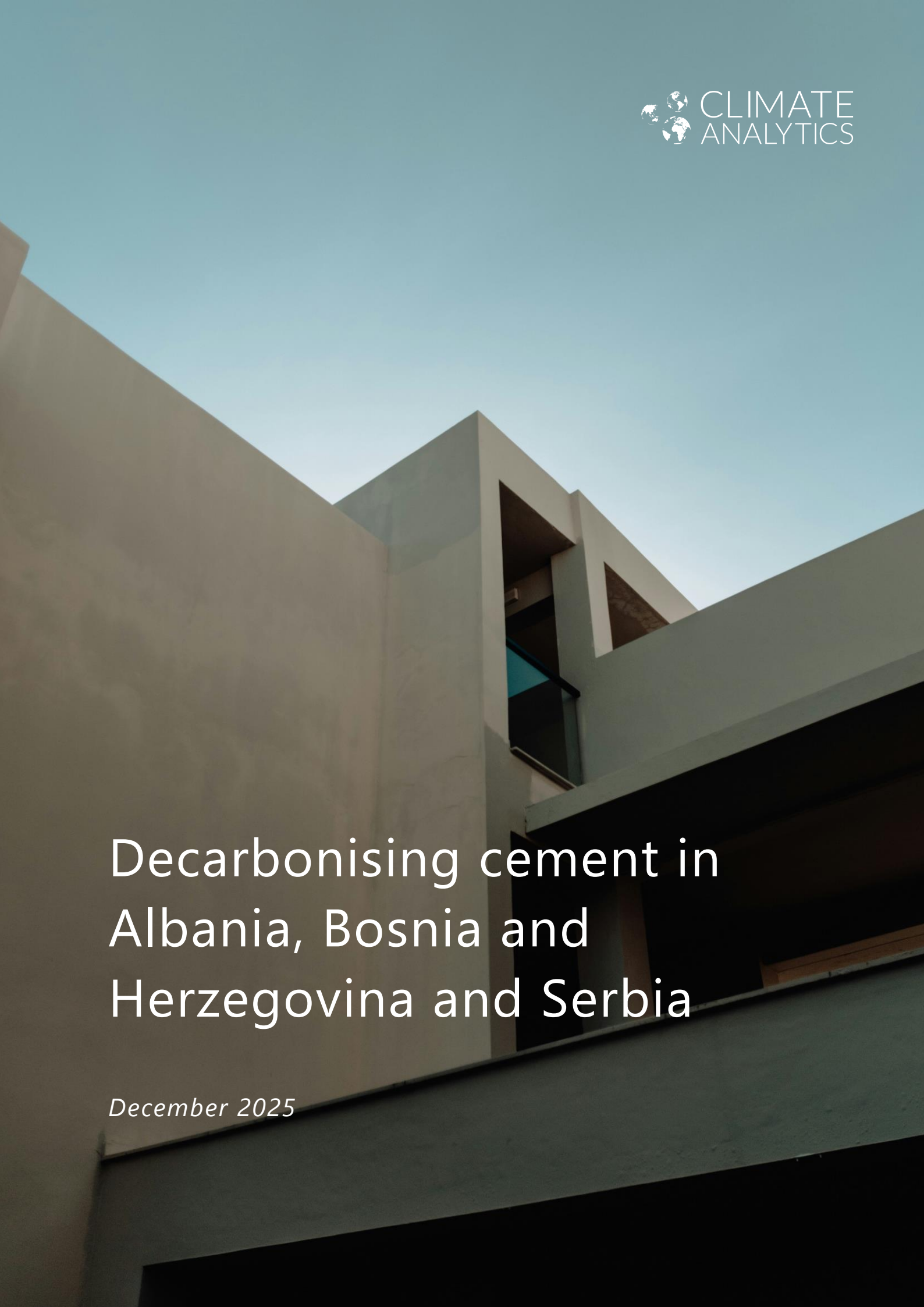

CLIMATE ANALYTICS

Decarbonising cement in Albania, Bosnia and Herzegovina and Serbia

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About Climate Analytics

Climate Analytics is a global climate science and policy institute. Our mission is to deliver cutting-edge science, analysis and support to accelerate climate action and keep warming below 1.5°C.

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Summary

The introduction of the European Union's Carbon Border Adjustment Mechanism (EU's CBAM) fundamentally reorients market dynamics in the cement sector. To protect European producers as they transition to lower carbon modes of production, CBAM places a price on embedded carbon in cement. The higher the carbon intensity, the higher the carbon price.

CBAM therefore renders business-as-usual a poor business strategy. As exporters of cement to the EU, Albania, Bosnia and Herzegovina, and Serbia all stand to gain from taking a proactive approach to supporting the decarbonisation of their cement industries. Countries such as Türkiye and Morocco have already developed decarbonisation roadmaps for their national cement industries, backed up by carbon pricing mechanisms. It is critical that Western Balkan regulators and industry follow suit to maintain their market share and continue exporting to the EU.

Interviews with industry stakeholders in Albania, Bosnia and Herzegovina, and Serbia show a myriad of attitudes towards CBAM and its disruptive impact on the market. There is a clear need for closer collaboration with government to support CBAM alignment. Industry can also be expected to lead in cutting their own plant-level emissions. Within the three countries, some producers are further ahead in reducing their emissions. Slow actors will almost certainly lose competitiveness in the EU market.

At the international level, technological innovations are driving emissions reductions in cement. Critically, many of these technologies are cost effective and scalable in the Western Balkans. Clinker substitution, alternative fuels, and electrification of non-kiln processes can be implemented in Western Balkan cement plants today, cutting both emissions and costs. Numerous sources of green finance exist at the international level, which Western Balkan cement producers can access to support emissions reduction measures.

Regulators can pull several levers to unlock mitigation potential for their cement sectors. Carbon pricing, subsidies, streamlining of permitting processes, and green public procurement policies can create market conditions which support the production of low carbon cement. While carbon pricing is a precondition for EU accession, the other examples can ease the upfront cost of decarbonising production and stimulate demand for low carbon cement. Ultimately, Western Balkan regulators can take an 'all of the above' approach to supporting their cement industries to align with CBAM, thereby securing jobs and attracting investment into the long term.

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Introduction

The cement industry is responsible for 5-8% of global carbon dioxide (CO_2) emissions,[1] making it a critical sector to decarbonise to align with the Paris Agreement and countries' national climate targets. The cement industry's reliance on fossil fuel and carbon-intensive production processes give it a reputation as a hard-to-abate sector. Traditionally, these processes have not been easy to replace. This is changing, however, due to technological innovations which reduce the carbon intensity of cement. Regulatory developments further change the industry landscape, with policy priorities at the national and international level driving demand for low carbon cement.

The introduction of the European Union's Carbon Border Adjustment Mechanism (CBAM) represents a key shift in the international trade environment for countries who export cement to the European Union (EU).[2] CBAM prices embedded carbon in cement which is imported into the EU. The more carbon-intensive the product, the higher the price the importer must pay. By extension, low carbon cement producers will have a competitive advantage when exporting to the EU. In the case of Albania, Bosnia and Herzegovina (BiH) and Serbia, all three countries export cement to the EU and are thus exposed to a loss in competitiveness if emissions are not reduced in line with CBAM requirements.

This paper seeks to assess potential decarbonisation options for the cement industry in Albania, Bosnia and Herzegovina and Serbia to maintain their competitiveness in light of CBAM and to contribute to national emissions reductions which are aligned with the Paris Agreement. In doing so, we provide an overview of the cement industry in the target countries and its exposure to CBAM. Further, we evaluate the state of the cement industry internationally, gleaning good practices which can potentially be applied to the Western Balkan context. This paper relies on both desk research and original interviews with industry stakeholders. It is one of a series of papers examining the risk and resilience to the CBAM in the **electricity, iron and steel, cement, and chemical** sectors in Albania, Bosnia and Herzegovina, and Serbia.

[1] Danyang Cheng et al., "Projecting Future Carbon Emissions from Cement Production in Developing Countries," *Nature Communications* 14 (2023), https://doi.org/10.1038/s41467-023-43660-x.

[2] European Commission, "Commission Implementing Regulation (EU) 2023/1773 of 17 August 2023 Laying down the Rules for the Application of Regulation (EU) 2023/956 of the European Parliament and of the Council as Regards Reporting Obligations for the Purposes of the Carbon Border Adjustment Mechanism during the Transitional Period," 2023, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32023R1773.

Hard-to-abate emissions: cement's foundational problem

Clinker is cement's main component, and most cement emissions originate from clinker production. Around 85-90% of emissions occur in just two steps in the production process: the energy used to heat kilns (large, rotating furnaces which heat the raw materials), and the calcination of limestone, which releases stored CO_2 as it is calcified.[3,4] The remaining 10% of emissions mostly come from the electricity used in other stages in cement's production as well as the transport of materials (see Figure 1).

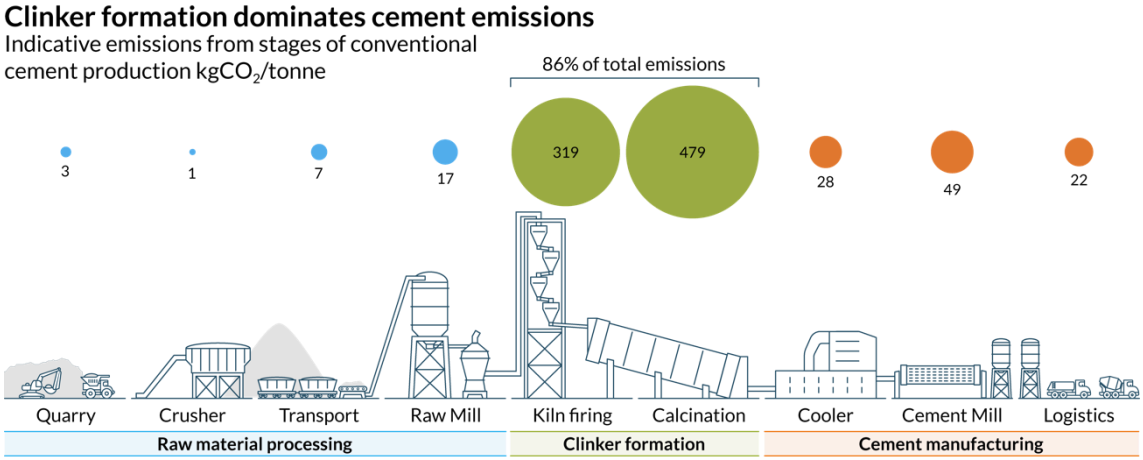

Figure 1: *Indicative emissions from the conventional cement production process, adapted from Czigler et al. (2020).*[5]

Electrifying cement production by replacing fossil fuels with renewable energy is not as straightforward as in other sectors. Scope 1 emissions, which are direct emissions from a cement plant, generally come from fossil fuel combustion for kilns. As kilns require extremely high temperatures to be heated (~1450°C),[6] renewable-generated electricity

[3] *The Big Problem with Cement, and How to Fix It*, directed by Vox, 2023, https://www.youtube.com/watch?v=asLWBGtAhZk.
[4] Igor A. Bashmakov et al., "Industry," in *Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*, ed. Priyadarshi R. Shukla et al. (Cambridge University Press, 2022), https://doi.org/10.1017/9781009157926.013.
[5] Thomas Czigler, Sebastian Reiter, Patrick Schulze, and Ken Somers, *Laying the Foundation for Zero-Carbon Cement* (McKinsey & Company, 2020).
[6] Ametek Land, "Temperature Measurements in Cement Manufacture," n.d., https://www.ametek-land.com/-

struggle to reach the necessary temperatures. Reducing kiln emissions often revolve around energy efficiency instead, which can reduce the amount of fossil fuels needed. Market-ready alternatives to fossil fuels do exist, primarily biomass and waste-derived fuels. Technologies which generate heat from electricity are beginning to break into the market,[7] creating the possibility for even deeper emissions reductions (see this section for further information on technological innovations).

The 10% of cement emissions unrelated to clinker formation, existing renewable technologies can already meet those energy needs.[8] These can be Scope 1 or 2, depending if the power is generated on-site (scope 1) or bought from the grid (scope 2). Addressing these stages are relatively low hanging fruit which can give forward-thinking cement companies a competitive advantage.

Decarbonising the calcination process is similarly tricky. The raw materials used to make clinker (primarily limestone, but also chalk, marl and dolomite) all store carbon. When they are calcified, CO_2 is released into the atmosphere.[9] If clinker is produced, the release of carbon is inevitable. The crux of the problem therefore lies with the share of clinker in the final product. Viable substitutes to clinker are already available (see this section for further information), providing innovative companies with an opportunity to cut emissions while matching clinker for quality and cost-effectiveness. Restructuring operations to cut clinker, can, like investments in alternative fuels, cut emissions and give sustainable cement manufacturers a competitive advantage – particularly if combined with a supportive policy environment.

International overview

The global emissions intensity of cement has remained just under 0.6 tCO_2 per tonne of cement produced since 2018.[10] To align with the International Energy Agency's (IEA's) net zero scenario, the global cement industry would need to cut its emissions to 0.45

/media/ameteklandinstruments/documentation/industries/cementlime/ametek_land_application_note_temperature_measurement_in_cement_manufacturing_rev1.pdf.

[7] Alfie Lloyd-Perks, "Adani Cement and Coolbrook Deploy World's First Commercial RotoDynamic Heater," World Cement, 2025, https://www.worldcement.com/product-news/14112025/adani-cement-and-coolbrook-deploy-worlds-first-commercial-rotodynamic-heater/.

[8] Hyae Ryung Kim et al., "Decarbonizing Cement," Columbia Business School, 2024, https://business.columbia.edu/sites/default/files-efs/imce-uploads/CKI/Documents/CKI%20Cement-241017.pdf.

[9] Kim et al., "Decarbonizing Cement."

[10] International Energy Agency, "Tracking Clean Energy Progress 2023," 2023, https://www.iea.org/reports/tracking-clean-energy-progress-2023.

tCO_2 per tonne of cement by 2030. By 2050, this would fall to 0.03 tCO_2 per tonne of cement.[11, 12]

Europe is leading the way, with the EU's largest cement manufacturers committing to a 30% reduction in CO_2 below 1990 levels by 2030.[13] EU taxonomy specifies that emissions per tonne of cement must be no greater than 0.469 tCO_2.[14] Despite tightening regulations around cement emissions, Europe's cement market is expected to grow at a rate of 4-5% annually between 2025-2029 through public infrastructure projects and climate-resilient building programmes.[15]

Technological innovations are increasingly bridging the gap between carbon reductions and cost-effectiveness. Leading innovations can be grouped into (for a full breakdown of these technologies, see here):

- Clinker substitutes
- Near zero carbon cement
- Energy efficiency
- Alternative fuels
- Carbon Capture and Storage (CCS)

[11] International Energy Agency, "Tracking Clean Energy Progress 2023."
[12] World Economic Forum, "The Net-Zero Industry Tracker: Cement Industry," 2022, https://es.weforum.org/publications/the-net-zero-industry-tracker/in-full/cement-industry/.
[13] S&P Global, "Decarbonizing Cement: How EU Cement-Makers Are Reducing Emissions While Building Business Resilience," 2022, https://www.spglobal.com/sustainable1/en/insights/special-editorial/decarbonizing-cement-how-eu-cement-makers-are-reducing-emissions-while-building-business-resilience.
[14] European Commission, "EU Taxonomy Navigator," 2025, https://ec.europa.eu/sustainable-finance-taxonomy/activities/activity/272/view.
[15] Research and Markets, "Europe Cement Industry Report 2025 | Market Is Set to Grow 5.8% Annually, Reaching $21.1 Billion This Year, Driven by Public Infrastructure and Green Initiatives - Forecast to 2029," 2025.

National cement sectors in the Western Balkans

Albania

The cement industry is a significant component of Albania's industrial sector and a major contributor to its national greenhouse gas emissions. According to the 2024 State of the Environment Report, cement production accounts for almost 90% of emissions from Albania's Industrial Processes and Product Use (IPPU) sector.[16] These national inventory figures primarily report on process emissions from calcination. Data on energy use from fuel combustion within the industry is not separately specified in national statistics, making a top-down calculation of total emissions difficult.[17]

Economically, the broader mining and minerals industry, which includes cement manufacturing, contributed 1.2% to Albania's gross domestic product (GDP) in 2022.[18] Raw materials for cement are abundant, with non-metallic minerals representing the largest category of domestic extraction (10.84 million tonnes in 2023).[19] The industry is also an important exporter. In 2023, cement was Albania's 16th most exported product globally.[20] A significant portion of these exports are directed to the EU, with Italy being a key destination (export value of USD 13 million in 2023).[21] This direct trade link makes the sector highly exposed to the CBAM.

This exposure is amplified by Albania's current national carbon pricing policy. While Albania has an excise "carbon tax" on fossil fuels, it does not have a direct carbon price on emissions that would be deductible under CBAM rules (see *Decarbonising electricity in Albania, Bosnia and Herzegovina and Serbia*[22], the first paper in this series, for an

[16] Agjencia Kombëtare e Mjedisit (2024). Raporti i Gjendjes në Mjedis 2024. Tiranë. p. 159.
[17] Urban Research Institute (2022). Additional potential of energy efficiency for the enhancement of Albania's NDC 2030. GCF Readiness and Preparatory Support Project. p. 46.
[18] EITI Albania (2024). Extractive Industries Transparency Initiative in Albania: Report for Fiscal Year 2022. p. 98.
[19] INSTAT (2025). Llogaritë e Flukseve të Materialeve Mjedisore, 2023. Tiranë. p. 1, Tabela 1.
[20] The Observatory of Economic Complexity (OEC) (2024). Cement in Albania Trade. Retrieved November 10, 2025.
[21] The Observatory of Economic Complexity (OEC) (2024). Cement in Albania Trade. Retrieved November 10, 2025.
[22] Climate Analytics (2025). "Decarbonising electricity in Albania, Bosnia and Herzegovina and Serbia", https://climateanalytics.org/publications/decarbonising-electricity-cement-iron-and-steel-and-chemicals-in-albania-bosnia-and-herzegovina-and-serbia

introductory analysis of CBAM).[23] A planned increase in the carbon tax on coal, a key fuel for the industry, was postponed from January 2024 to July 1, 2026, following requests from industry stakeholders.[24] As the existing carbon tax prices a product's embedded carbon, Albanian cement exporters will be required to pay the full CBAM levy on exports to the EU as there will be no domestic cost eligible to be deducted.

In response to these regulatory and market pressures, leading cement companies in Albania have initiated their own decarbonisation efforts:

- Colacem has focused on co-processing, utilising 4,321 tonnes of Solid Recovered Fuel (SRF) in 2024 to substitute fossil fuels.[25]
- Antea Cement (Titan Group), the country's largest producer, reports that it operates according to EU Best Available Techniques (BAT). The company's 2024 ESG data shows its decarbonisation strategy is focused heavily on clinker substitution and efficiency. Its specific heat consumption (kcal/kg clinker) was reduced to 768 in 2024, compared to 794 in 2023.[26] The company's 2023 report listed a 0% alternative fuel substitution rate, indicating its primary mitigation levers were clinker factor reduction and energy efficiency.[27] According to representatives from the company, clinker substitution is currently not feasible as the import of the substitute material is prohibited under Albanian law.

These company plans and actions are in line with Albania's national climate strategy. The 2024 National Energy and Climate Plan (NECP) identifies clinker replacement as one of the primary mitigation measures for the cement industry.[28]

[23] EITI Albania (2024). Extractive Industries Transparency Initiative in Albania: Report for Fiscal Year 2022. p. 30-31.
[24] Shqiptarja.com (2023). Shtyhet afati për rritjen e taksës së karbonit për qymyrin, hyn në fuqi në 1 Korrik 2026 jo në 1 Janar 2024... [Deadline for increasing the carbon tax on coal postponed, enters into force on July 1, 2026 not January 1, 2024...]. Published December 1, 2023.
[25] Colacem (2025). Rapporto di Sostenibilità 2024. p. 84.
[26] Antea Cement. Sustainability Report 2024. p. 25.
[27] Antea Cement. Sustainability Report 2024. p. 25.
[28] Ministry of Infrastructure and Energy (2024). National Energy and Climate Plan of the Republic of Albania. p. 118.

Bosnia and Herzegovina

In 2023, Bosnia and Herzegovina's exports to the EU amounted to EUR 8.18 billion, with the sectors covered by CBAM (including cement) accounting for EUR 880 million or about 21% of the country's total exports to the EU.[29] Cement itself accounted for approximately 30% of these CBAM-related exports.[30] Accordingly, the estimated export quantities of CO_2 emissions from the cement sector for 2023 amounted to around 1.4 $MtCO_2e$.[31] Based on the average price of EU carbon permits for 2023, importers would need to pay over EUR 119 million in CBAM-related costs for Bosnian cement.[32]
From 2026, companies from Bosnia and Herzegovina will have to pay about EUR 123 million per year for carbon emissions, and estimates show that this amount will grow to EUR 223 million by 2034.[33, 34] This will put an additional burden on the cement industry and other sectors covered, and by 2034 this cost could exceed EUR 328 million if the carbon price rises above EUR 100 per tonne.[35] The industrial sector in Bosnia and Herzegovina alone contributed approximately 23% of GDP in 2023, which includes sectors such as manufacturing, construction and energy.[36] This figure shows a slight decline compared to 2022, when the industry's contribution was 25%.[37] Within this sector, construction materials, including cement, account for around 3% of GDP. Cement, being the largest single product in this segment, is estimated to contribute approximately 1.5–2% of Bosnia and Herzegovina's total GDP, according to data from the largest domestic producer, Heidelberg Materials Cement BiH, and the Agency for Statistics of Bosnia and Herzegovina.[38]

[29]KPMG, "CBAM Research," KPMG.
[30] KPMG, "CBAM Research," KPMG.
[31] K KPMG, "CBAM Research," KPMG.
[32] All currency related figures converted from Bosnia-Herzegovina Convertible Marka to Euro, based on November 2025 conversion rates.
[33] KPMG Preliminary CBAM Analysis (https://www.klix.ba/biznis/privreda/evropska-regulativa-donosi-izazove-bh-izvoznicima-visoki-troskovi-na-pomolu/240910020)
[34] https://taxation-customs.ec.europa.eu/carbon-border-adjustment-mechanism_en
[35] KPMG Preliminary CBAM Analysis (https://www.klix.ba/biznis/privreda/evropska-regulativa-donosi-izazove-bh-izvoznicima-visoki-troskovi-na-pomolu/240910020)
[36] Lloyds Bank. Bosnia and Herzegovina: Economic and Political Overview. https://www.lloydsbanktrade.com/en/market-potential/bosnia-and-herzegovina/economical-context.
[37] S. Risteska, C. Redl, J. Ecke i R. Kunert, "The EU's Carbon Border Adjustment Mechanism: Challenges and Opportunities for the Western Balkan Countries," Agora Energiewende, 2022.
[38] Agency for Statistics of Bosnia and Herzegovina https://bhas.ba/ Heidelberg Materials https://www.heidelbergmaterials.com/en

Cement companies in Bosnia and Herzegovina have already began optimising their production in recent years:

- Kakanj Cement Plant, a subsidiary of Heidelberg Materials, which produces up to 700,000 tons of cement annually, started using alternative fuels a few years ago, i.e. those obtained from waste, and are now already importing RDF (Refuse-Derived Fuel, mix of biomass and waste) and SRF (Solid Recovered Fuel).[39] In 2021, the share of alternative fuels in cement production was 10%.[40] To achieve this percentage, they imported about 3,500 tons of RDF and burned about 1,200 tons of tires.

- Lukavac Cement, whose annual production capacity of clinker is 700,000 tons and cement 900,000 tonnes,[41] meets around 55% of its production through alternative fuels. The company imports industrial and municipal waste from Italy, Slovenia and Austria, i.e. from countries where there is a systematised method of waste processing that meets prescribed EU and national criteria and standards.[42] Bosnia and Herzegovina also has internal standards that alternative fuel manufacturers must follow, but there are no manufacturers in the country that meet these criteria.

Despite these developments, the cement sector in Bosnia and Herzegovina must continue to reduce its carbon footprint. By using alternative fuels such as industrial and municipal waste, not only does the share of CO_2 in emissions decrease, but also the methane generated by the disposal of the waste itself decreases. There is no secondary disposal of waste in this process, as the ash generated during processing is integrated into the semi-finished product in low concentrations. An aggravating circumstance is the fact that, currently, most alternative fuels used by the Bosnia and Herzegovina cement industry are imported from other countries. Improving access to local resources to fuel cement production can reduce emissions while developing a homegrown industry in Bosnia and Herzegovina.

[39] Snaga lokalnog. Heidelberg Materials Cement BiH marks anniversary of founding – Record broken this year, 780,000 tons of cement produced. https://snagalokalnog.ba/en/heidelberg-materials-cement-bih-marks-anniversary-of-founding-record-broken-this-year-780000-tons-of-cement-produced/
[40] State Electricity Regulatory Commission (DERK), "Report on the Work of the State Electricity Regulatory Commission for 2023," DERK, Tuzla, 2023.
[41] Agency for Statistics of Bosnia and Herzegovina (BHAS), "Foreign Trade of Bosnia and Herzegovina in 2023," Agency for Statistics of Bosnia and Herzegovina, Sarajevo, 2023.
[42] State Electricity Regulatory Commission (DERK), "Report on the Work of the State Electricity Regulatory Commission for 2023," DERK, Tuzla, 2023.

Serbia

Serbia has a total cement production capacity of approximately 2.7 million tons per year (30% of the Central Balkan capacity) and, aside from Croatia, is the only member of the Western Balkans in Cembureau, the European cement association. In 2023, cement accounted for 83% of emissions from Serbia's mineral industries (all mineral industries together accounted for 2.6% of national emissions). These emissions do not account for energy use from the cement sector. Serbia's national inventory report does not provide data on how much emissions from energy use in the cement sector.[43]

In 2022, Serbia's cement sector contracted by 11% compared to 2021. Only Slovakia recorded a similar level of decline. Negative demographic trends (population decline of -0.7% per year, to 6.62 million in 2023) further reduces the potential for long-term growth in domestic consumption.[44] Infrastructure projects will likely be the largest source of domestic cement demand.

In 2023, Serbia's cement exports to the EU were worth EUR 19.7 million, representing a 63% increase compared to 2020.[45] According to Trendeconomy, cement (HS-2523) accounted for only 0.044% of Serbia's total exports in 2023, indicating that, although cement exports exist and are growing, they remain a minor sector in the country's overall export structure.[46] Cement plants in Serbia supply most of their production to the domestic and regional markets, with roughly a quarter of exports going to the EU. Given that cement is one of the most carbon-intensive products, CBAM will further burden each exported bag of cement with embedded CO_2 costs, putting pressure on producers to accelerate decarbonisation through the use of alternative fuels (biomass, waste), CO_2 capture and clinker substitution.[47]

Serbian cement production is reliant on coal, half of which came from Russia and Ukraine until 2021, which, following the start of the war in Ukraine, seriously

[43] Government of Serbia, "National Greenhouse Gas Inventory Document of Serbia 2025", 2025, https://unfccc.int/documents/646484.
[44] Global Cement, "Update on the Central Balkans, August 2024," 2025, Update on the Central Balkans, August 2024.
[45] Ibid.
[46] The Observatory of Economic Complexity, 2023. Cement in Serbia Trade. available at: https://oec.world/en/profile/bilateral-product/cement/reporter/srb? (accessed 12 September 2025).
[47] Vladimir Kljajić, "CBAM dolazi: Da li je Srbija spremna za novu zelenu Evropu?", Zelena Agenda, 2025, available at: https://www.zelenaagenda.rs/post/cbam-dolazi-da-li-je-srbija-spremna-za-novu-zelenu-evropu? (accessed 12 September 2025).

jeopardised supply stability.[48] Holcim Srbija is constructing a new cement plant near the Nikola Tesla B coal power plant. The new plant will process one million tons of ash annually, helping to dispose of the power plant's waste while reducing emissions compared to cement generated from coal combustion.[49] At the national level, Serbia is implementing a carbon price in response to CBAM. To this end, it is the most advanced of the three assessed countries in terms of instituting a carbon price which will deduct from the CBAM price.[50]

Implications of CBAM for cement exporters

Understanding CBAM

To prevent carbon leakage (i.e. the movement of production to countries with weaker environmental regulations), the EU introduced the Carbon Border Adjustment Mechanism (CBAM).[51] CBAM intends to rectify the risk of carbon leakage by placing a price on carbon-intensive products being imported into the EU.[52] The lower the carbon intensity, the lower the price. This puts companies who implement environmentally friendly business practices at an advantage. Conversely, companies with emissions-intensive production processes (in comparison to other companies in their sector) face a disadvantage when exporting to the EU.[53]

[48] Global Cement, 2024. Update on the Central Balkans. available at: https://www.globalcement.com/news/item/17798-update-on-the-central-balkans-august-2024? (accessed 12 September 2025).
[49] Jelisaveta Perišić, "Lafarge Serbia to Build First Plant Using Ash in Cement Production," *Balkan Green Energy News*, 2024, https://balkangreenenergynews.com/lafarge-serbia-to-build-first-plant-using-ash-in-cement-production/.
[50] Energy Community Secretariat, "2025 CBAM-Readiness Tracker", 2025, https://www.energy-community.org/news/Energy-Community-News/2025/10/17.html.
[51] European Commission, "Carbon Leakage," 2021, https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets/free-allocation/carbon-leakage_en.
[52] European Commission, "Commission Implementing Regulation (EU) 2023/1773 of 17 August 2023 Laying down the Rules for the Application of Regulation (EU) 2023/956 of the European Parliament and of the Council as Regards Reporting Obligations for the Purposes of the Carbon Border Adjustment Mechanism during the Transitional Period."
[53] For further assessment of the impact of CBAM on Albania, BiH and Serbia, see the first paper of this series: Climate Analytics (2025). Decarbonising electricity in Albania, Bosnia and Herzegovina and Serbia, https://climateanalytics.org/publications/decarbonising-electricity-cement-iron-and-steel-and-chemicals-in-albania-bosnia-and-herzegovina-and-serbia

CBAM has already stimulated reforms in countries who export cement to the EU. Türkiye, a major cement exporter, has introduced an emissions trading scheme (ETS), developed a decarbonisation roadmap, planned emissions reduction targets for its cement sector, and is implementing emissions reduction measures such as the use of alternative fuels, with the intention of supporting pilot projects combining hydrogen with carbon capture, utilisation, and storage (CCUS).[54,55,56] Similarly, Morocco is launching a carbon tax and has developed a decarbonisation roadmap for its cement and steel sectors.[57,58]

Implementing some form of carbon pricing is a critical response to adapt to CBAM. CBAM prices carbon once a product is imported into the EU, with those proceeds being kept within the EU. However, if that carbon is already priced in the country it was manufactured in, then the carbon embedded in the product will not be taxed twice.[59] Non-EU countries, otherwise known as third countries, such as those in the Western Balkans, are thus left with a choice: tax the carbon and keep the revenue within the country, or let the EU tax it and keep the revenue for itself.

[54] Climate Change Presidency, "Türkiye Emisyon Ticaret Sistemi Yönetmeliği Taslağı Yayımlandı (Draft Regulation on Turkish Emission Trading System Published)," 2025, https://www.iklim.gov.tr/turkiye-emisyon-ticaret-sistemi-yonetmeligi-taslagi-yayimlandi-haber-4519.
[55] Republic of Turkey Ministry of Industry and Technology and PwC Türkiye, "A Low Carbon Pathway for the Cement Sector in the Republic of Türkiye," 2024.
[56] Republic of Turkey Ministry of Environment Urbanisation and Climate Change, "2053 Long Term Climate Strategy," 2024, https://unfccc.int/sites/default/files/resource/Turkiye_Long_Term_Climate_Strategy.pdf.
[57] Badr Elhamzaoui, "Taxe Carbone. Pour Le Maroc, Une Entrée En Vigueur En Janvier 2026 (Carbon Tax. For Morocco, Entry into Force in January 2026)," Medias24, 2025, https://medias24.com/2025/01/27/taxe-carbone-une-entree-en-vigueur-imminente-en-janvier-2026/.
[58] Ali Hasanbeigi and Cecilia Springer, "Industrial Decarbonization Roadmap Framework for the Cement and Steel Industry in Morocco (A White Paper)," United Nations Industrial Development Organization, 2024, https://downloads.unido.org/ot/33/26/33262565/UNIDO%20Morocco%20industrial%20decarbonization%20roadmap.pdf.
[59] European Commission, "Carbon Border Adjustment Mechanism (CBAM): Questions and Answers," 2023, https://taxation-customs.ec.europa.eu/system/files/2023-11/CBAM%20Frequently%20Asked%20Questions_November%202023.pdf.

Applying a carbon price to cement

Some form of carbon pricing is essential if Western Balkan countries are to fully benefit from CBAM's impact on the cement industry. As noted in *Decarbonising electricity in Albania, Bosnia and Herzegovina and Serbia,* the first paper in this series, introducing a carbon price is a prerequisite for EU candidate countries who wish to complete the accession process.[60] It also ensures that the price placed on cement is collected by the target countries rather than by the EU.

Various methods to price carbon exist, each with their own benefits and trade-offs. For instance, a market-based ETS can set a cap on total cement emissions, with companies who emit above their allocated limit buying emissions allowances from companies who emit below their limit. Alternatively, a carbon tax simply taxes emissions directly. While a market-based ETS is more effective in ensuring emission reduction targets are met, a carbon tax is less demanding administratively.[61]

Serbia is the furthest along in this regard, with a carbon tax to be introduced in 2026. The tax will start at EUR 4 per tCO_2e and will gradually increase to EUR 40 per tCO_2e.[62] BiH and Albania also plan to introduce an ETS, although Bosnia and Herzegovina is considering an electricity-only ETS.[63] While this can stimulate decarbonisation of electricity and thus the reduction of Scope 2 emissions from electricity generation in the cement industry, it would not impact Scope 1 emissions from fuel combustion in kilns or process emissions form clinker production.

When introducing an ETS, careful consideration should be given to ensuring how to best incentivise reducing Scope 1 emissions in the cement industry. Historically, the EU ETS has granted free allowances to the cement industry, with those allowances tied to clinker content. In other words, cement producers effectively did not pay for much of the CO_2 they emitted. However, these free allowances are to be phased out in conjunction with the gradual introduction of CBAM. Additionally, as the free allowances

[60] Climate Analytics (2025). "Decarbonising electricity in Albania, Bosnia and Herzegovina and Serbia", https://climateanalytics.org/publications/decarbonising-electricity-cement-iron-and-steel-and-chemicals-in-albania-bosnia-and-herzegovina-and-serbia
[61] Ioannis Charalampidis et al., "Impact Assessment for the Establishment of a Regional Emission Trading System in Energy Community Contracting Parties – NEAR.A3," *Trinomics*, 2024, https://www.energy-community.org/news/Energy-Community-News/2025/01/14.html.
[62] Bogdan Gecić, "Simplifying CBAM: What It Means for Non-EU Businesses in Europe (and Beyond)?," Gecić Law, 2025, https://www.geciclaw.com/carbon-border-tax/.
[63] Energy Community Secretariat, "2025 CBAM-Readiness Tracker," 2025, https://www.energy-community.org/news/Energy-Community-News/2025/10/17.html.

were tied to clinker, producers were not incentivised to move away from clinker towards less carbon-intensive materials.[64] Tying an ETS to cement rather than clinker therefore represents a technology neutral approach which can drive reductions in clinker content.

Perspectives of Western Balkan industry stakeholders on CBAM

Private sector stakeholders in Albania, Bosnia and Herzegovina, and Serbia hold mixed opinions regarding carbon pricing, with some seeing it exclusively as a threat to their competitiveness in EU markets, while others see it as an opportunity. To some extent, perception of carbon pricing as a threat to competitiveness in EU markets is a justification for CBAM – to prevent carbon leakage to countries with laxer environmental regulations. Nevertheless, capital costs associated with transitioning to low carbon cement production (such as new equipment and stranded assets) should not be dismissed, particularly as European companies have had a longer time to align with the EU's domestic ETS.

That dynamic – of European firms being further along in the decarbonisation process than Western Balkan firms – plays out also within the three target countries. Foreign-owned cement companies in the Western Balkans tend to be closer to CBAM alignment than their domestically owned peers, as the parent companies, who are often based in Europe, have stricter environmental standards which subsidiaries are expected to comply with. For instance, Western Balkan subsidiaries of European companies already conducted quarterly reporting of Scope 1, 2 and 3 emissions prior to the introduction of CBAM, whereas such detailed reporting is still not done by some locally owned cement factories (ALB2, ALB5, BIH1, BIH3).

There is a general sense among stakeholders that government support for aligning with CBAM is insufficient (ALB1, ALB2, ALB3, ALB4, ALB5, BIH4, SRB4, SRB5). Clear guidance on how to meet the reporting requirements has not been adequate, with the need for more coordination and capacity development in the form of workshops, manuals and online sources identified. One stakeholder highlights a lack of expertise within the government itself, with answers to specific technical questions regarded by the industry stakeholder as 'often inadequate' (BIH4). While insufficient government support is

[64] James Bowen, "Decarbonising Cement: A Review of EU and German Policies and Regulations, with Recommendations for China," Climate Analytics, 2025, https://climateanalytics.org/publications/decarbonising-chinas-cement-industry.

commonly cited, industry has had several years to take the initiative to prepare for CBAM. To that end, some have gone further than others. Two industry stakeholders highlight that they took ownership of monitoring their emissions in order to prepare for CBAM (BIH3, SRB3).

Shifting the market towards low carbon cement

Establishing a supportive regulatory environment

European countries (particularly the Netherlands, Sweden, Germany, France, and the United Kingdom) lead the way in developing a regulatory environment which supports low carbon cement.[65] For instance, governments can stimulate demand for low carbon cement through green public procurements, whereby cement sourced for public infrastructure projects is environmentally friendly. One example comes from Ireland, which mandates that cement used for public projects must be low carbon.[66] Another comes from Germany, which has a decentralised procurement system with over half of public procurements occurring at the municipal level.[67] In Berlin, green public procurements are an important part of meeting the city's goal of climate neutrality by 2045. In doing so, minimum environmental criteria is considered when awarding contracts, with recycled concrete being used for constructing high-rise buildings.[68, 69]

[65] Cheng et al., "Projecting Future Carbon Emissions from Cement Production in Developing Countries."
[66] Government of Ireland, "Procurement Guidance for Public Bodies: Reducing Embodied Carbon in Construction," 2024, https://enterprise.gov.ie/en/publications/guidance-public-bodies-reducing-embodied-carbon-in-construction.html.
[67] Astrid Nilsson Lewis et al., "Green Public Procurement: A Key to Decarbonizing Construction and Road Transport in the EU," Stockholm Environment Institute, 2023, https://www.sei.org/wp-content/uploads/2023/02/green-public-procurement-eu-1.pdf.
[68] Olga Chiappinelli and Vera Zipperer, "Using Public Procurement as a Decarbonisation Policy: A Look at Germany," *Deutsches Institut Für Wirtschaftsforschung* 7, no. 49 (2017): 523–32.
[69] Irene Domínguez Pérez et al., "Green Public Procurement of Cement and Steel in the EU: An Overview of the State of Play," Bellona, 2024, https://eu.bellona.org/publication/gpp-of-cement-and-steel-in-the-eu/.

In the Netherlands, a CO_2 performance ladder (CO2PL) rewards a fictitious discount of up to 10% of a bid price based on the company's climate ambition. Each step on the ladder indicates higher climate ambition, and a resulting higher subsidy. This provides sustainably minded companies with an immediate return on their green investments. The Netherlands' CO2PL is widely considered best practice, with organisations who are on it reducing their emissions twice as fast as the Dutch average (see this section for a more complete analysis of this policy).[70]

Governments also encourage the use of low carbon cement through reforms to product standards. High clinker shares in cement are unnecessary and can be replaced with less carbon-intensive substitutes. European standards already allow for low clinker-to-cement ratios, supporting uptake of clinker substitutes.[71] There is also a push within Europe to move towards a performance-based system.[72, 73] Rather than exclusively meeting prescribed composition ratios, performance-based standards can drive low-carbon innovation by measuring how the cement performs. This opens the space for new alternatives to clinker without compromising quality. Performance-based standards already exist, with some countries taking a hybrid approach alongside a prescriptive system (Peru, United States) and others using solely performance-based indicators (Ecuador, El Salvador).[74]

Subsidies

Alongside regulations, governments can support cement companies through subsidies. These subsidies can either ease the financial burden on companies as they invest in existing low-carbon technologies, or they can de-risk R&D and early-stage pilot projects for more ambitious companies. In the Western Balkan context, pilot phases can be skipped by implementing commercially viable technologies which have been trialled in Europe, helping to offset risk and early costs.

[70] RPS Group, "Reducing Embodied Carbon in Cement and Concrete Through Public Procurement in Ireland," Government of Ireland, 2024.
[71] Cembureau, "Clinker Substitution in the Cement Industry," 2024, https://cembureau.eu/media/qeohlghe/240305-cembureau-position-faq-on-clinker-substitution.pdf.
[72] Cembureau, "A New Momentum for Standardisation," 2023, https://cembureau.eu/media/h3kfr53y/231006-cembureau-position-dual-approach-in-standardisation-final.pdf.
[73] Environmental Coalition on Standards, "Moving to Performance-Based Cement and Concrete Standards in Europe: What Lessons Can We Learn from Other Countries?," 2024, https://ecostandard.org/publications/international-performance-based-cement-concrete-standards/.
[74] Environmental Coalition on Standards, "Moving to Performance-Based Cement and Concrete Standards in Europe: What Lessons Can We Learn from Other Countries?"

Government funding for industrial decarbonisation can come from revenue collected through carbon pricing, as is done in Europe where the EU ETS feeds the Innovation Fund, a financing mechanism which supports the deployment of low carbon technologies.[75] A feedback loop is therefore established where carbon-intensive manufacturing is discouraged while the upfront costs of decarbonising are reduced. This model is successfully implemented in the EU, where the Innovation Fund, financed by the ETS, provides financial support for innovative low-carbon technologies.[76] Such a fund is highlighted as necessary for industry to align with CBAM (BIH2, BIH3, BIH4, SRB5).

The Innovation Fund supports a wide array of low-carbon projects, including in the areas of electrification, hydrogen, and carbon capture and storage (CCS).[77] Parent companies of Balkan-based cement producers have been past recipients of Innovation Fund subsidies. These include Heidelberg Materials and TITAN Cement Group, both of which have received support for numerous CCS projects.[78,79]

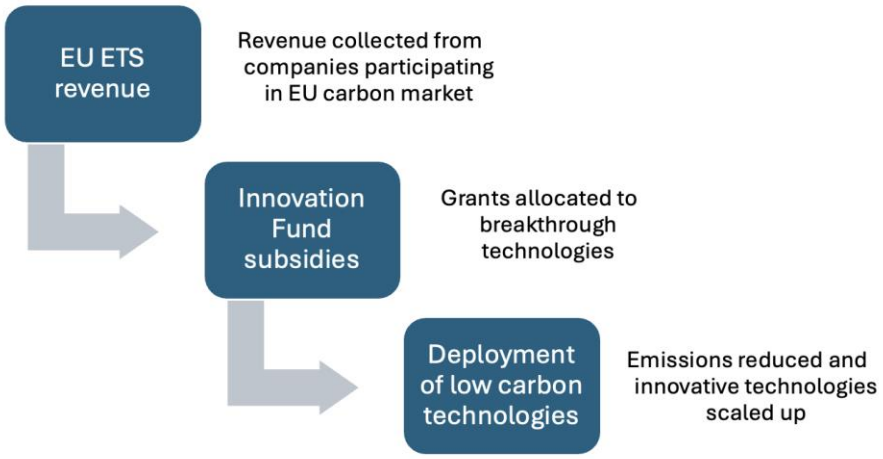

Figure 2: *Demonstration of how ETS revenue is directed towards low carbon technologies through the Innovation Fund.*

[75] European Commission, "What Is the Innovation Fund?," 2024, https://climate.ec.europa.eu/eu-action/eu-funding-climate-action/innovation-fund/what-innovation-fund_en.
[76] European Commission, "Innovation Fund: Deploying Innovative Net-Zero Technologies for Climate Neutrality," n.d., https://cinea.ec.europa.eu/programmes/innovation-fund_en.
[77] European Commission, "Projects Selected for Grant Preparation," n.d., https://climate.ec.europa.eu/eu-action/eu-funding-climate-action/innovation-fund/calls-proposals/large-scale-calls/projects-selected-grant-preparation_en.
[78] Christoph Beumelburg, "Heidelberg Materials Secures Four Additional EU Innovation Fund Grants to Drive Decarbonisation Projects," Heidelberg Materials, 2025, https://www.heidelbergmaterials.com/en/pr-2025-11-03.
[79] European Commission, "IFESTOS: IFESTOS – One of the Largest Carbon Capture Projects in Europe to Enable the Production of Zero Carbon Cement Concrete and Create Decarbonization Synergies with Regional Industries," 2025, https://ec.europa.eu/assets/cinea/project_fiches/innovation_fund/101133204.pdf.

One stakeholder notes that EU companies have benefitted from ETS-related subsidies for years, supporting their decarbonisation efforts. However, Balkan companies must abide by CBAM without the ETS connected subsidies (SRB3). Further, EU cement companies were exempted from carbon pricing under the ETS, something which Western Balkan exporters to the EU do not benefit from under CBAM. Changes are expensive – not only at the technical level, but also at the employee level as training and upskilling needs to be done (ALB5). There is therefore a critical need to establish a fund which directs subsidies towards CBAM alignment (BIH2, BIH4, SRB5).

Innovations in low/zero carbon cement manufacturing

Clinker substitutes

Beyond the regulatory environment, the global cement industry is making headway towards decarbonisation. Despite the industry's notoriously hard-to-abate nature, innovative technologies are breaking through with the potential to cut cement emissions cost-effectively.

Given that clinker is responsible for 90% of cement emissions, the most straightforward emissions reduction measure is to cut clinker's share in the end product.[80] This is the least disruptive measure for factories, as it effectively maintains existing processes but modifies the cement's composition. While clinker cannot be fully taken out of traditional cement production, its share can be reduced to around 50%.[81] A range of substitutes exist (known as Supplementary Cementitious Materials, or SCMs) for clinker without impacting quality. Fly ash (waste from coal plants), slag (from the iron and steel industry), gypsum, clay, natural pozzolans and unprocessed limestone are some of the main substitutes used internationally.[82, 83]

[80] Michael Purton, "Cement Is a Big Problem for the Environment. Here's How to Make It More Sustainable," World Economic Forum, 2024, https://www.weforum.org/stories/2024/09/cement-production-sustainable-concrete-co2-emissions/.
[81] G Habert et al., "Environmental Impacts and Decarbonization Strategies in the Cement and Concrete Industries," *Nature Reviews Earth & Environment* 1, no. 11 (2020): 559–73, https://doi.org/10.1038/s43017-020-0093-3.
[82] *The Big Problem with Cement, and How to Fix It*.
[83] Thiago Costa Cardoso et al., "Ternary Cements Produced with Non-Calcined Clay, Limestone, and Portland Clinker," *Journal of Building Engineering* 45 (2022).

In Serbia, a new cement factory is being built with the intention of using one million tons of ash each year from a nearby coal plant.[84] From the point of view of cement industry emissions, this is certainly preferable to relying solely on clinker. Some Albanian stakeholders advocate for the state to allow companies to import fly ash from the EU and Kosovo in order to reduce their clinker content, as Albania does not have its own coal-fired thermal power plants (ALB2).

Long term, however, it is a risky material to rely on. Western Balkan countries have committed to decarbonising their electricity grids, and Serbia's National Energy and Climate Plan anticipates coal production being abandoned by 2050.[85] This would also be necessary to align with CBAM and ultimately join the EU. Therefore, relying on fly ash is not a viable long term strategy – particularly if all factories were to take this approach to clinker substitution. Similar issues exist with the use of steel slag as the steel industry also decarbonises.[86]

One of the more promising solutions is limestone-calcined-clay cement (LC3). LC3 is cheaper than clinker, widely available, and has the potential to reduce cement emissions by 40%.[87] Critically, the majority of cement plants can integrate LC3 into their production process relatively easily, and staff do not require special training – the latter of which has been identified as a barrier to decarbonisation in the Western Balkans (ALB5). Additionally, as kilns do not need to be heated to the same extent as when producing conventional cement, there is a significant improvement in energy efficiency.[88] The use of LC3 for cement production is expanding across Europe, with numerous plants using it to replace traditional Portland cement production. Some of these are highlighted in Table 1.

[84] Jelisaveta Perišić, "Lafarge Serbia to Build First Plant Using Ash in Cement Production," *Balkan Green Energy News*, 2024, https://balkangreenenergynews.com/lafarge-serbia-to-build-first-plant-using-ash-in-cement-production/.
[85] Republic of Serbia, *Integrated National Energy and Climate Plan of the Republic of Serbia for the Period 2030 with the Projections up to 2050* (2024).
[86] Cembureau, "Clinker Substitution in the Cement Industry."
[87] Swiss Agency for Development and Cooperation, "LC3 – A Sustainable Alternative for the Cement Industry," 2022, https://weadapt.org/knowledge-base/lc3-a-sustainable-alternative-for-the-cement-industry/.
[88] Fuller Technologies, "Revealing the Numbers behind Calcined Clay," 2021, https://www.fuller-technologies.com/cement-hub/posts/revealing-the-numbers-behind-calcined-clay.

European plants producing cement from LC3

Plant/product name	Location	Key characteristics
AUMUND Fördertechnik	Rheinberg, Germany	Uses an electrified 'Linear Calcination Conveyor' to produce LC3 cements from calcined clay, reducing emissions by 40% compared to Portland cement.
FUTURECEM	Denmark, France, Benelux	Produced by Cementir, FUTURECEM cement reduces emissions by 30% while maintaining strength and quality.
Holcim	Saint-Pierre-la-Cour, France	Produces 500,000 tonnes of cement per year, reducing emissions by 50%. The operations are powered with 100% biomass-based alternative fuels and waste heat recovery systems.
Vicat Group	Xeuilley, France	Produces 400 tonnes per day of LC3 cement, with operations powered by 100% alternative fuels. ,

Table 1: Name, location and key characteristics of European plants producing cement with LC3.

Near zero carbon cement

While reducing clinker content can halve emissions compared to traditional Portland cement, cutting edge R&D programmes are developing cement which can remove clinker from the process entirely. Numerous technologies exist with the potential to transform the global cement industry, though all are at early stages and in need of scaling up before they achieve cost parity with existing processes.

Brimstone, a US-based company, manufactures cement from carbon-free calcium silicate rocks. This eliminates the calcination process, and by extension the emissions associated with it.[89] This process can make both regular Portland cement as well as SCMs. At scale, Brimstone expects this technology to achieve cost parity with traditional processes, creating carbon-neutral cement.[90] This cement is already commercially

[89] Kim et al., "Decarbonizing Cement."
[90] Brimstone, "Brimstone - Technology," 2025, https://www.brimstone.com/technology.

viable, with Amazon signing a commercial agreement with Brimstone to use its cement across its facilities.[91]

Another US company, Sublime Systems, produces carbon neutral cement through electrochemistry. Sublime's cement does not rely on extremely high temperatures to break down limestone, allowing the production process to be powered entirely be renewable energy. As the materials used to produce Sublime's cement are not calcified, they do not release CO_2. Instead, cementitious chemicals are extracted and blended together at the proportions necessary for the construction industry.[92] Sublime has also signed long term commercial agreements – in this case Microsoft and Suffolk.[93]

Various clinker alternatives can not only avoid the calcination process, but instead go through carbonation. As the raw materials are processed, they can bind with CO_2. In other words, they store CO_2 instead of releasing it. This allows for huge emissions reductions compared to traditional Portland cement. Examples include magnesium silicate–based cements and geopolymer or alkali-activated binders.[94] In the case of magnesium silicate–based cements in particular, the carbonation process actively strengthens the end product as it makes it a denser and more compressed material.[95] Geopolymer or alkali-activated are already mature enough to be deployed at scale.[96]

Energy efficiency

Improving energy efficiency provides a key opportunity to reduce emissions and cut costs over the long term. European cement producers have halved their energy use compared to the 1960s through continuously upgrading their facilities.[97] In particular,

[91] Zachary Skidmore, *Amazon Partners with Brimstone for Supply of Low Carbon Cement*, 2025, https://www.datacenterdynamics.com/en/news/amazon-partners-with-brimstone-for-supply-of-low-carbon-cement/.
[92] Sublime Systems, "Manufacturing Process," n.d., https://sublime-systems.com/our-process/.
[93] Heather Clancy, "How Microsoft's Deal with a Low-Carbon Cement Startup Will Cut Its Data Center Emissions," Trellis Magazine, 2025, https://trellis.net/article/microsoft-deal-low-carbon-cement-startup/.
[94] Johanna Lehne and Felix Preston, *Making Concrete Change: Innovation in Low-Carbon Cement and Concrete* (Chatham House, the Royal Institute of International Affairs, 2018).
[95] Dezhi Wang et al., "Compressive Strength and Water Resistance of Magnesium Oxysulfate (MOS) Cement Incorporating Magnesium Slag," *Construction and Building Materials*, no. 453 (2024).
[96] Waltraud M. Kriven et al., "Why Geopolymers and Alkali-activated Materials Are Key Components of a Sustainable World: A Perspective Contribution," *Journal of the American Ceramic Society* 107, no. 8 (2024): 5159–77, https://doi.org/10.1111/jace.19828.
[97] Cembureau, "Thermal Energy Efficiency," 2018, https://lowcarboneconomy.cembureau.eu/5-parallel-routes/energy-efficiency/thermal-energy-efficiency/.

phasing out wet kilns in favour of dry kilns – 80% of global and 90% of European cement producers now use dry kilns. [98, 99]

Newer and retrofitted plants can install waste heat recovery systems, which capture lost heat from kilns and then use that heat to generate electricity throughout the plant.[100] A key challenge to introducing these systems is the upfront cost, though speeding up permitting times can streamline the process for companies.[101]

Some cement plants have connected with district heating systems to supply electricity to residential homes from surplus heat generated from heating kilns. This reduces reliance on fossil fuel generated electricity while creating a new revenue source for cement producers.[102, 103]

Alternative fuels

Alternative fuels are perhaps the emissions reduction measure most easily scalable in the Western Balkans. Most options are biomass and waste-derived fuels such as wood pellets, sawdust, animal meal, sewage sludge, tyres, paper ash, and blends of municipal and industrial waste.[104, 105] Around 60% of European cement plants use alternative fuels to some extent, with some factories generating nearly 100% of their energy from these fuels.[106] There is a desire among Western Balkan stakeholders to increase the use of biomass and waste-derived fuels, though they feel that government policy hinders uptake (ALB2, BIH1).

[98] In dry kilns, raw materials are ground into a fine powder. In wet kilns, the raw materials are first mixed with water.
[99] Kim et al., "Decarbonizing Cement."
[100] Mohamed Gomaa et al., "Experimental Investigation on Waste Heat Recovery from a Cement Factory to Enhance Thermoelectric Generation," *Sustainability* 14, no. 16 (2022), https://doi.org/10.3390/su141610146.
[101] Cembureau, "Thermal Energy Efficiency."
[102] State of Green, "Surplus Heat from Industry Keeps Citizens Warm," 2021, https://stateofgreen.com/en/solutions/surplus-heat-from-industry-keeps-citizens-warm-2/.
[103] Orcan Energy, "Holcim, E.ON and Orcan Energy Launch Joint Large-Scale Project to Decarbonize the Cement Industry," 2025, https://www.orcan-energy.com/en/details/holcim-e-on-and-orcan-energy-launch-joint-large-scale-project-to-decarbonize-the-cement-industry.html.
[104] Cembureau, "Alternative Fuels," 2018, https://lowcarboneconomy.cembureau.eu/5-parallel-routes/resource-efficiency/alternative-fuels/.
[105] Nickolaos Chatziaras et al., "Use of Waste Derived Fuels in Cement Industry: A Review," *Management of Environmental Quality: An International Journal* 27, no. 2 (2016): 178–93, http://dx.doi.org/10.1108/JEDT-04-2014-0019.
[106] Holcim, "Decarbonizing Holcim with Alternative Fuels," 2023, https://www.holcim.com/who-we-are/our-stories/decarbonizing-holcim-alternative-fuels.

Switching out fossil fuels for alternative fuels is relatively straightforward and has little impact on costs. Indeed, they often lead to cost savings.[107] Use of alternative fuels carry the added benefit of reducing the amount of waste that is sent to landfills.[108] On the part of governments, implementing waste strategies which reward the benefits of utilising waste as fuel can allow cement producers to use alternative fuels cost-effectively.[109] However, emissions reductions as a result of biomass and waste-derived fuels are relatively low.[110, 111] While they are preferable to fossil fuels, particularly coal, they are not sufficient to place the industry on a 1.5°C compatible path. There are also supply considerations – competing demands from other sectors limit the amount of biomass and waste-derived fuels which the cement industry can rely on.[112]

Stakeholders from the Western Balkan cement industry highlight issues with government and public perception of alternative fuels derived from biomass and waste, which inhibit their uptake. For instance, one Bosnian interviewee explains that, despite BiH's federal government supporting the use of alternative fuels, local governments reject permits that would reduce reliance on coal. As the interviewee puts it, to use something other than coal is a "big bogeyman" (BIH1). Resistance to change is also highlighted by another Bosnian stakeholder (BIH2). Further, although the German Corporation for International Cooperation (GIZ) aimed to start an initiative which could determine how to direct Bosnian waste towards the cement industry, the project failed to take off as "only a few recognised the importance of waste recovery for the cement industry… The cement industry looks at waste as a resource, but in BiH, waste is seen as garbage" (BIH1). Albanian stakeholders also highlight that state support is needed for alternative fuels (ALB2).

Other alternative fuels which can contribute to deeper emissions cuts while effectively heating kilns include hydrogen and renewable-based heaters. These include the deployment of heaters powered by renewables by Adani in India and successful

[107] Kim et al., "Decarbonizing Cement."
[108] Ali Hasanbeigi and Navdeep Bhadbhade, "Emissions Impacts of Alternative Fuels Combustion in the Cement Industry," *Global Efficiency Intelligence*, 2023.
[109] Cembureau, "Alternative Fuels."
[110] Hasanbeigi and Bhadbhade, "Emissions Impacts of Alternative Fuels Combustion in the Cement Industry."
[111] Kim et al., "Decarbonizing Cement."
[112] Ziyad Sherif et al., "A Critical Review of the Decarbonisation Potential in the U.K. Cement Industry," *Materials* 18, no. 2 (2025), https://doi.org/10.3390/ma18020292.

hydrogen trials at a UK-based cement plant owned by Heidelberg Materials.[113, 114, 115] Importantly, hydrogen used for cement production should be green, i.e. produced by renewables rather than fossil fuels. Direct electrification through plasma technologies is also promising, though it is not ready for mass deployment in the short term.[116,117]

Carbon capture and storage

Carbon capture and storage (CCS) is generally seen by the industry as central to solving cement's hard-to-abate nature. Some national decarbonisation plans heavily rely on CCS technologies, assuming a breakthrough in costs that can unlock their deployment at scale.[118] The world's first cement plant with a CCS facility is in operation in Norway, showing potential for the technology.[119] Worldwide, 48 CCS projects are planned or are under construction.[120]

Although combining CCS with biomass (BECCS) can theoretically generate negative emissions,[121] applying CCS technologies to the cement industry is technically challenging and energy and cost intensive.[122] There is therefore significant risk to relying on CCS as a miracle technology for the sector. As CCS technologies are not available at scale, they are an unproven technology to hinge decarbonisation strategies on.

[113] Lloyd-Perks, "Adani Cement and Coolbrook Deploy World's First Commercial RotoDynamic Heater."
[114] Heidelberg Materials, "Academic Study Confirms Success of Ribblesdale World-First Hydrogen Fuel Trial," 2024, https://www.heidelbergmaterials.co.uk/en/news-and-events/world-first-hydrogen-fuel-trial-study-confirms-success.
[115] Samuel Adu-Amankwah et al., "Mixed Hydrogen and Biofuels Cement Clinker: Characterisation, Microstructure, and Performance," *Cement and Concrete Composites*, 2024.
[116] Heidelberg Materials, "Major Breakthrough for Plasma-Heated Cement Kiln in Sweden," 2025, https://www.heidelbergmaterials-northerneurope.com/en/major-breakthrough-for-plasma-heated-cement-kiln-in-sweden.
[117] Sebastian Quevedo Parra and Matteo C. Romano, "Decarbonization of Cement Production by Electrification," *Journal of Cleaner Production*, 2023.
[118] Republic of Turkey Ministry of Industry and Technology and PwC Türkiye, "A Low Carbon Pathway for the Cement Sector in the Republic of Türkiye."
[119] Heidelberg Materials, "First CO_2 Captured in Brevik as Part of Ramp-up Phase," 2025, https://www.brevikccs.com/en/node/522705.
[120] IEA, "CCUS Projects Database," 2025, https://www.iea.org/data-and-statistics/data-product/ccus-projects-database.
[121] Lucas Desport et al., "Feasibility, Conditions, and Opportunities for Achieving Net-Negative Emissions in the Global Cement Industry," *International Journal of Greenhouse Gas Control* 141 (2025).
[122] Andrew Reid, *Carbon Capture and Storage: Europe's Climate Gamble* (IEEFA, 2024), https://ieefa.org/resources/carbon-capture-and-storage-europes-climate-gamble.

Good practices

Develop a decarbonisation roadmap

A policy without a plan is like a map without directions. Only with a clear set of goals and timelines can the cement industry develop an effective and orderly transition which aligns with CBAM cost-effectively – maximising economic opportunities and ensuring no unintended consequences. A decarbonisation roadmap which is co-created by industry and government can integrate public and private sector concerns, helping to align policies and incentives in a comprehensive strategy. This can provide certainty to investors and allows various government departments to align their strategies towards a common goal.

Türkiye provides a case study which Western Balkan countries can follow in drafting a decarbonisation roadmap designed to align its cement industry with long term climate targets and CBAM.[123] A thorough decarbonisation roadmap should be underpinned by detailed modelling. Models can generate various scenarios for the cement industry, both in terms of economic and investment potential, as well as cost-effective and feasible emissions reduction policies. Clear timelines drives coherent policy planning for government and industry alike.

Aside from a national decarbonisation roadmap, individual companies can integrate sustainability concerns into their own strategies. As one stakeholder notes, "every company has to think long term. Without strategic planning and education of its staff, there is no success of the company" (BIH1). A certain amount of responsibility lies on the companies themselves to drive things ahead and develop sustainable business models. Nevertheless, clear policy is needed to guarantee investor confidence. Private sector stakeholders highlight the need for greater awareness of regulatory changes and how to comply with them (ALB4, ALB5, SRB5). Suggestions include recorded seminars, practical guides, an online information platform, and a specialised contact point in the government (ALB2, ALB4, ALB5, BIH4, SRB4, SRB5).

In developing a decarbonisation roadmap, companies can use the Cement Decarbonisation Tool produced by the International Finance Corporation. The tool is simple to use and supports companies to analyse their unique operational factors and

[123] Republic of Turkey Ministry of Industry and Technology, "A Low Carbon Pathway for the Cement Sector in the Republic of Türkiye," 2024.

resulting emissions, allowing them to identify cost-effective measures to cut emissions.[124]

Public outreach and policy reform to increase the uptake of alternative fuels

As already noted (see this section), local governments resist the replacement of fossil fuels with alternative energy sources. A shift in attitude is thus critical, with outreach needed to increase public acceptance. Concerns around the burning of waste is not unique to the Western Balkans, and lessons can be taken from other countries where public outreach programmes have occurred. Key to increasing public acceptance is a focus on transparency and education around the safety and environmental benefits of alternative fuels.[125] To that end, cement companies can lead the way, with support where needed from government. In Germany, public acceptance increased when the Verein Deutscher Zementwerke, an industry association, published plant emission data which demonstrated the safety of alternative fuels.[126] Heidelberg Materials organises open days, plant tours, and informs local communities of the alternative fuels they use to maintain a positive relationship with communities located close to their plants.[127]

Government has an important part to play in establishing a regulatory environment which encourages the use of alternative fuels. This involves setting standards for the quality of waste-derived fuels, streamlining the permitting process, proper waste collection and disposal, and raising landfill taxes to improve the economic case for co-processing (i.e. burning of alternative fuels by cement companies) over landfilling. GIZ and Holcim have published guidelines which countries can follow to align their regulations with good practice in this area, supporting both reductions in cement emissions as well as the amount of waste sent to landfill.[128]

Electrification of non-kiln processes

Non-kiln processes account for around 10% of a plant's emissions. These emissions are relatively low-hanging fruit, with technologies readily available on the market that can

[124] IFC, "IFC Cement Decarbonization Tool," 2024, https://www.ifc.org/en/what-we-do/sector-expertise/manufacturing/decarbonization/cement-decarbonization-tool.
[125] Sadie Prigmore and Moses Olayemi, "Public Perception of Cement Industry Decarbonization: A Case Study of Oklahoma," American Society for Engineering Education, 2024.
[126] Cemnet, "Experiences with Alternative Fuels," 2020, https://www.cemnet.com/News/story/169021/experiences-with-alternative-fuels.html.
[127] Heidelberg Materials, "Heidelberg Materials Alternative Fuels & Raw Materials (AFR) Policy," 2024, https://www.heidelbergmaterials.com/sites/default/files/2024-05/Heidelberg_Materials_AFR_Policy.pdf.
[128] GIZ and LafargeHolcim, "Guidelines on Pre- and Co-Processing of Waste in Cement Production," 2020, https://www.giz.de/en/downloads/giz-2020_en_guidelines-pre-coprocessing.pdf.

reduce a plant's operating costs. In Serbia, Holcim (formerly Lafarge) plans to electrify its trucks and build a 26 MW solar plant which can electrify around 9% of its annual electricity consumption, while the rest could be covered from producers with green certificates. However, it has faced a slow permitting process that has stalled construction.[129, 130] Lags in issuing permits are concerning – in cases where cement companies are ready to take the lead in decarbonisation efforts, they are slowed down by red tape. Speeding up permitting times will be critical to allowing industry to access cheap renewable energy. Relevant authorities can hire dedicated, well-trained personnel to focus exclusively on processing renewable projects.[131]

In general, Western Balkan governments can improve incentives for the use of wind and solar (BIH5). These can involve subsidies to ease the upfront capital costs and power purchase agreements (PPAs). PPAs are long-term contracts which guarantee that a business will buy electricity from a renewable energy provider, thereby ensuring a consistent source of revenue and reducing investor risk.[132]

Companies close to each other can develop shared renewable projects which they draw electricity from, supporting CBAM alignment and energy savings while sharing the upfront cost (BIH4). This sort of industrial cluster model can be seen in the United Kingdom, where energy-intensive industries collaborate on shared infrastructure, thereby speeding up the rollout of low carbon technologies while reducing the cost incurred by each company. This applies not only to clean energy, where grid connections can also be streamlined, but also other technologies such as green hydrogen and CCS.[133] Through economies-of-scale, costs and investment risks are lowered. Although the UK is further ahead of the Western Balkans in terms of

[129] Balkan Green Energy News, *Urban Construction Waste – Potential Game Changer for CBAM-Affected Industries in Serbia*, 2023, https://balkangreenenergynews.com/urban-construction-waste-potential-game-changer-for-cbam-affected-industries-in-serbia/.
[130] Balkan Green Energy News, *Serbia's Energy-Intensive Industries Brace for CBAM, Seek State Support to Apply Decarbonization Solutions*, 2024, https://balkangreenenergynews.com/serbias-energy-intensive-industries-brace-for-cbam-seek-state-support-to-apply-decarbonization-solutions/.
[131] CAN Europe, "Overcoming Barriers for Renewable Energy Deployment in the Western Balkans: The Case of North Macedonia and Serbia," 2024, https://caneurope.org/content/uploads/2024/01/FINAL-policy-brief.pdf.
[132] Barbara Frey, *The Energy Transition in the Western Balkans: The Status Quo, Major Challenges and How to Overcome Them*, no. 76, Policy Notes and Reports (Wiener Institut für Internaitonale Wirtschaftsvergleiche, 2024), https://wiiw.ac.at/the-energy-transition-in-the-western-balkans-the-status-quo-major-challenges-and-how-to-overcome-them-dlp-6896.pdf.
[133] UK Research and Innovation, "Enabling Net Zero: A Plan for UK Industrial Cluster Decarbonisation," 2023, https://www.ukri.org/what-we-do/browse-our-areas-of-investment-and-support/industrial-decarbonisation/.

regulatory maturity around low carbon technologies, a lighter version of this can be implemented which first focuses on sharing access to renewable electricity. As Western Balkan grids are in need of modernisation and permitting times are slow, this can reduce associated costs and waiting times, helping to drive electrification and CBAM alignment.

Green public procurement

Given public infrastructure projects represent a major source of cement demand, reforming public procurement policy can drive demand for low carbon cement. Much of future cement demand in the Western Balkans will likely come from major infrastructure projects, making green public procurement policies particularly impactful. The CO_2 performance ladder (CO2PL), which originated in The Netherlands and is increasingly used across Europe, serves as a best practice example showing how government's buying power can be leveraged to reward companies who cut emissions in their production processes and supply chains.

The updated version of the CO2PL contains three steps (there were formerly five). Each step represents a stronger emission reduction effort, with companies being awarded a higher step commensurate to deeper decarbonisation. A company can then receive a fictitious discount of up to 15% when bidding for a public tender.[134]

How the CO2PL is integrated into a tender evaluation

Company	Bidding price	CO2PL ambition level	CO2PL award advantage	Fictitious price when evaluating bids	Awarding of contract and final price
A	€ 500,000	No CO2PL ambition level	0%	€ 500,000	
B	€ 540,000	Step 1	5%	€ 513,000	
C	€ 515,000	Step 2	10%	€ 463,500	
D	€ 520,000	Step 3	15%	€ 442,000	Wins contract & receives €520,000

Table 2: Example of an evaluation process for a public tender which factors in the CO2PL.

[134] Stichting Klimaatvriendelijk Aanbesteden en Ondernemen, "Procurement Guide 4.0: Co2 Performance Ladder 4.0 Award Criterion," 2025, https://www.co2performanceladder.com/blog/applying-the-co2-performance-ladder-4-0-award-criterion-in-four-steps/.

The CO2PL stimulates demand for low carbon products as, by improving an organisation's chance of winning a contract, they receive an immediate return on their investment. Dutch organisations on the CO2PL reduce their emissions twice as fast as organisations not on the CO2PL,[135] and two thirds of the companies that win tenders with the CO2PL are SMEs.[136]

From a regulatory perspective, the CO2PL is a simple and straightforward policy to implement. As third party accreditors ensure that a company complies with the policy, there are low transaction costs for public authorities. To this end, it is a highly effective policy tool for countries where government agencies have low capacity or experience with green public procurement.[137]

Access green finance

The cement industry has generally struggled to access green finance relative to other sectors where emissions reduction efforts are cheaper. However, there are a range of international green finance options which Western Balkan companies can access to ease the upfront cost of switching to low carbon modes of production. Much of these are EU based, but other international institutions are also present in the region. Prominent funders are highlighted in Table 3. The list does not cover every single source of green finance, but instead aims to highlight some of the key sources.

[135] RPS Group, "Reducing Embodied Carbon in Cement and Concrete Through Public Procurement in Ireland," Government of Ireland, 2024.
[136] CO2 Performance Ladder, "5 Questions about the CO_2 Performance Ladder for SMEs," 2025, https://www.co2performanceladder.com/blog/5-questions-about-the-co2-performance-ladder-for-smes/.
[137] Ronja Bechauf et al., "The CO2 Performance Ladder as a Tool for Low-Carbon Procurement: A Feasibility Study for 10 European Countries," IISD, 2023, https://www.iisd.org/system/files/2023-03/co2-ladder-tool-low-carbon-procurement.pdf.

Funding source	How support can be directed to the cement industry
European Union (EU)	The EU has a wide range of funding sources which Western Balkan companies can access. Prominent examples include: • The Western Balkans Enterprise Development & Innovation Facility, which supports SMEs through equity financing, loan guarantees, lending, and support services.[138] • The Green for Growth Fund invests in projects that reduce energy consumption, resource use and CO_2 emissions.[139] • The EU's European Investment Bank channels loans and grants towards low carbon projects and supports the mobilisation of private capital.[140]
European Bank for Reconstruction and Development (EBRD)	EBRD has financially supported numerous cement projects, including: • Investing USD 50 million in a Eurobond issued by Çimko, a Turkish cement company.[141] • Providing a USD25 million loan (in partnership with the EU) in energy efficiency improvements in an Egyptian cement plant owned by Arabian Cement Company.[142]

[138] WBEDIF, "Western Balkans Enterprise Development & Innovation Facility," n.d., https://www.wbif.eu/wb-edif.
[139] European Investment Bank, "Green for Growth Fund," n.d., https://www.eib.org/en/products/equity/funds/green-for-growth-fund.
[140] European Investment Bank, "EIB Global Channelled €693 Million to the Countries of the Western Balkans in 2024," 2025, https://www.eib.org/en/press/all/2025-098-eib-global-channelled-eur693-million-to-the-countries-of-the-western-balkans-in-2024.
[141] Dilara Sari, "EBRD Invests in Cement Company Eurobond in Türkiye," EBRD, 2025, https://www.ebrd.com/home/news-and-events/news/2025/ebrd-invests-in-cement-company-eurobond-in-tuerkiye.html#.
[142] Nibal Zgheib, "EBRD and EU Foster Energy Efficiency in Egypt's Cement Industry," EBRD, 2025, https://www.ebrd.com/home/news-and-events/news/2025/ebrd-and-eu-foster-energy-efficiency-in-egypt-s-cement-industry.html#.

International Finance Corporation (IFC)	• The IFC's Western Balkans Green Growth Alliance provides access to technical knowledge and funding opportunities.[143] • EUR 242 million in loans for low carbon cement in Senegal.[144]
GIZ/KfW	Bilateral support can come from a range of European countries. GIZ and KfW are highlighted due to their strong reputation and previous experience in the region. • GIZ, which focuses on technical support and capacity building, has previously led a project on improving waste-to-energy in the Western Balkan cement industry.[145] • KfW, who funds infrastructure projects, can support cement companies to secure funding for decarbonisation of their operations.
Climate Investment Funds (CIF)	CIF has an industry decarbonisation programme which supports emissions reductions in hard-to-abate industries in and has previous project experience in the Balkans.[146,147]
Green Climate Fund (GCF)	The GCF has a strong presence in the Balkans, with a wide portfolio of low carbon projects, generally delivered in the form of loans.[148]

Table 3: Potential green finance sources for Western Balkan cement producers.

[143] IFC, "Western Balkan Green Growth Alliance," 2025, https://www.ifc.org/en/what-we-do/programs-projects/western-balkans-green-growth-alliance.
[144] IFC, "Strengthening Sustainability in the Cement Industry," 2025, https://www.ifc.org/content/dam/ifc/doc/2025/2025-strengthening-sustainability-in-the-cement-industry.pdf.
[145] Co-Plan, "W2E – Waste to Energy for Western Balkans Cement Industry," 2022, https://www.co-plan.org/en/w2e-mbetjet-per-energjine-per-industrine-e-cimentos-ne-ballkanin-perendimor/.
[146] CIF, "Investing in Greener Industries," 2022, https://www.cif.org/news/investing-greener-industries.
[147] CIF, "Climate Investment Funds Approves $85 Million To Launch North Macedonia Coal Phase-Out," 2024, https://www.cif.org/news/climate-investment-funds-approves-85-million-launch-north-macedonia-coal-phase-out.
[148] Green Climate Fund, "2024 Annual Progress Report," 2024, https://www.greenclimate.fund/sites/default/files/document/gcf-annual-progress-report-2024.pdf.

Decarbonisation measures are often cost-effective over time. As the main barrier is the upfront cost of shifting a factory's production processes, access to green finance can alleviate the initial financial burden. A successful application involves numerous steps, including clear data showing the expected climate impact and a cost analysis which demonstrates the financial viability of the proposed project. Guidelines which corporates and policymakers can follow to develop a successful project proposal (as well as a supportive investment environment) include the OECD's Guidance on Transition Finance and the Japanese government's Green Loan and Sustainability-Linked Loan Guidelines, both of which are broadly applicable for all green financing institutions.[149, 150]

[149] OECD, "OECD Guidance on Transition Finance: Ensuring Credibility of Corporate Climate Transition Plans," 2022, https://www.oecd.org/en/publications/oecd-guidance-on-transition-finance_7c68a1ee-en.html.
[150] Ministry of the Environment of Japan, "Green Bond and Sustainability Linked Bond Guidelines," 2024, https://greenfinanceportal.env.go.jp/en/loan/guideline/guideline.html.

Conclusions

In the Western Balkan region – and globally – decarbonising cement is critical to aligning with the Paris Agreement's target of limiting global warming to 1.5°C. This imperative to decarbonise the industry is rooted not only in environmental considerations, but also, largely due to CBAM, also in economic ones. CBAM fundamentally reorients the market, whereby companies who produce low carbon cement will gain a competitive advantage over those whose product is more carbon intensive.

Despite its reputation as a hard-to-abate sector, the global cement industry is beginning to shift towards low carbon production. Low carbon technologies are being scaled up, with innovative public policy reducing upfront costs and driving demand for the end product.

Since CBAM's introduction, Türkiye and Morocco have already developed cement sector decarbonisation roadmaps backed by carbon pricing mechanisms. Unless Western Balkan governments follow suit, their cement industries will inevitably be disadvantaged against competitors in faster acting countries.

A multitude of cost-effective measures exist which can be deployed in the Western Balkan region. These include clinker substitution, use of alternative fuels, and electrification of non-kiln processes. On the regulatory side, policy options exist to unlock new opportunities for the cement industry. Applying a carbon price which aligns with the EU ETS, directing subsidies towards low carbon production, driving demand through green public procurement, and streamlining the process to access cheap and clean fuels can cut costs and drive emissions reductions.

Overall, CBAM shifts the landscape for cement producers. Decisive action, both from government and industry, is necessary to maintain and expand market share. As fast movers will be rewarded, Western Balkan governments and cement producers would do well to take concrete steps towards reducing their emissions sooner rather than later.

Annex 1

List of industry interviewees

Interviewee	Country	Industry
ALB1	Albania	Cement
ALB2	Albania	Cement
ALB3	Albania	Cement
ALB4	Albania	Cement
ALB5	Albania	NGO
BIH1	Bosnia and Herzegovina	Cement
BIH2	Bosnia and Herzegovina	Metals and manufacturing
BIH3	Bosnia and Herzegovina	Cement
BIH4	Bosnia and Herzegovina	Metals and manufacturing
BIH5	Bosnia and Herzegovina	Metals and manufacturing
SRB1	Serbia	Chemicals
SRB2	Serbia	Mining and metals
SRB3	Serbia	Construction
SRB4	Serbia	Construction
SRB5	Serbia	Steel

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