CareEdge-ESG's Research

Sustainable Energy Transition in India's Cement Industry

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CareEdge ESG RATINGS
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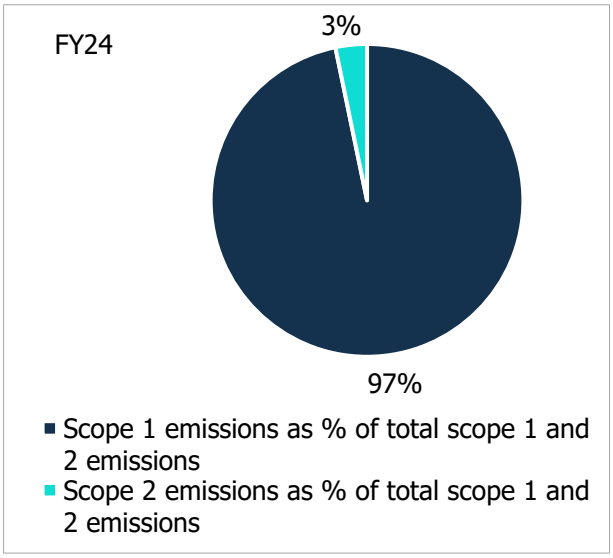
India is the second-largest cement producer globally, accounting for 8% of the global installed cement production capacity[1]. In 2024, India's cement production was estimated to be around 440.5 million metric tons[2]. However, cement production is also a significant contributor to India's CO_2 emissions, accounting for approximately 7% of the country's total CO_2 emissions[3]. India's cement industry has been steadily increasing its reliance on renewable energy, aiming for 40% renewable energy across its operations by 2025[4]. The industry has already installed over 1,800 MW of renewable energy capacity[5], primarily from solar, wind, and waste heat recovery systems (WHRS). The industry aims to add 4 to 5 GW of renewable capacity by 2030, backed by an estimated investment of USD 4 billion[5]. This shift is driven by the need to mitigate climate change and reduce carbon footprint.

CareEdge-ESG Analysis of the Sustainable Energy Transition in India's Cement Industry

CareEdge-ESG's analysis is based on a representative sample of 20 (from the top 1000 listed entities) leading cement manufacturing companies in India, selected based on their market capitalisation rankings on the National Stock Exchange (NSE)[6]. The insights presented are derived from companies' public disclosures and performance data based on FY23 and FY24. These companies represent a significant share of the industry's total production capacity. The sample encompasses a diverse mix of integrated cement plants and grinding units located across India.

Cement Industry's Carbon Footprint Primarily Driven by Direct Scope 1 Emissions

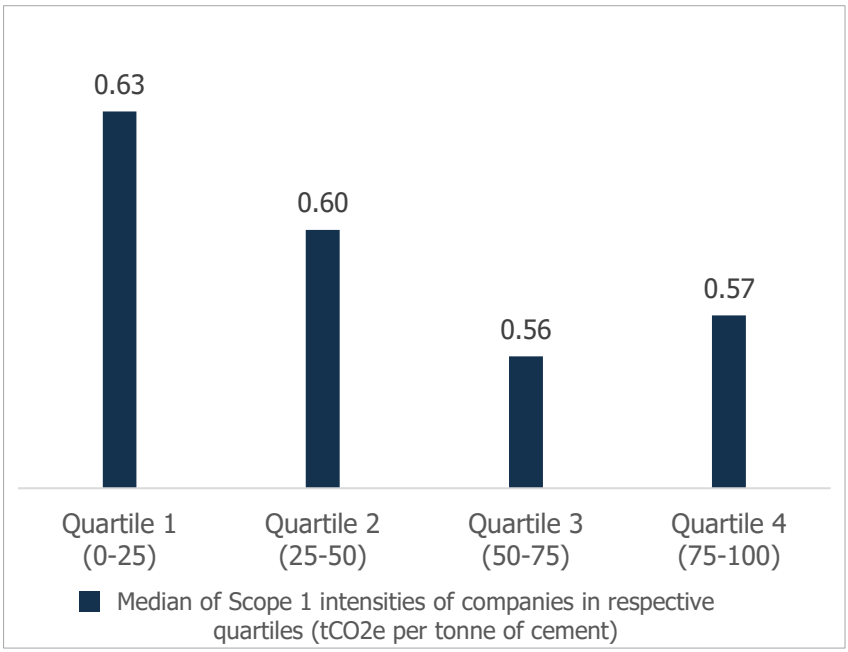
CareEdge-ESG's analysis shows that in FY24, Scope 1 emissions accounted for a significant 97% of the combined Scope 1 and 2 emissions in India's cement sector. This suggests that most emissions originate directly from core activities, especially fuel burning and clinker manufacturing. Conversely, Scope 2 emissions, which come from purchased electricity, make up only 3%, highlighting a lesser impact from grid energy. To meet sustainability and climate objectives, companies should focus on lowering Scope 1 emissions. This can be done by using alternative fuels, improving energy efficiency, adopting low-carbon technologies, optimising operational practices, and implementing carbon capture methods solutions.



[1] teriin.org
[2] cemnet.com
[3] gccassociation.org
[4] globalcement.com
[5] jmkresearch.com
[6] Market cap as of December 31, 2024

Breakdown of Differential Scope 1 Emission Intensities

As previously demonstrated, Scope 1 emissions constitute a dominant 97% of the total Scope 1 and 2 emissions in India's cement industry. Building on this, the subsequent CareEdge-ESG's analysis illustrates the variation in median Scope 1 emission intensities among companies segmented by quartiles. The quartile classification is based on cement production volumes, with companies grouped accordingly. Each quartile consists of five companies.



The analysis reveals an inverse relationship between production volume and Scope 1 emission intensity. Quartile 1, comprising companies with the lowest cement production volumes, exhibits the highest median Scope 1 emission intensity at 0.63 tCO_2e/ tonne of cement. This suggests that smaller-scale producers may face significant constraints such as limited financial capacity, restricted access to advanced technologies, lower economies of scale, and weaker operational efficiencies that hinder their ability to implement effective decarbonization strategies.

In contrast, Quartile 2 companies show a slightly lower median intensity of 0.60 tCO_2e/ tonne of cement, indicating marginal improvement. While these companies may have relatively better resources compared to Quartile 1, they still encounter barriers in deploying large-scale emissions reduction interventions. Their intermediate position reflects a transitional phase, wherein some decarbonization steps may be underway but not yet optimised.

Quartile 3 companies, with a median Scope 1 intensity of 0.56 tCO_2e/ tonne of cement, demonstrate a more noticeable shift towards efficiency. These medium-to-high production volume players are likely benefiting from greater economies of scale, enabling greater adoption of energy-efficient technologies, use of alternative fuels, or process optimisation measures that reduce emissions intensity.

Quartile 4, representing the highest cement production volume companies, records a median Scope 1 intensity of 0.57 tCO_2e/ tonne of cement. While slightly higher than Quartile 3, this still reflects comparative efficiency relative to lower quartiles. The marginal increase over Quartile 3 may be attributable to structural limitations or diminishing returns on emissions-reduction investments, especially as large producers may already be operating close to technical best practices. However, these companies typically possess stronger financial, technical, and managerial capabilities, allowing for broader and more sustained decarbonization efforts.

Renewable Energy Adoption in the Cement Industry

CareEdge-ESG's data shows that 95% of companies in India's cement sector used

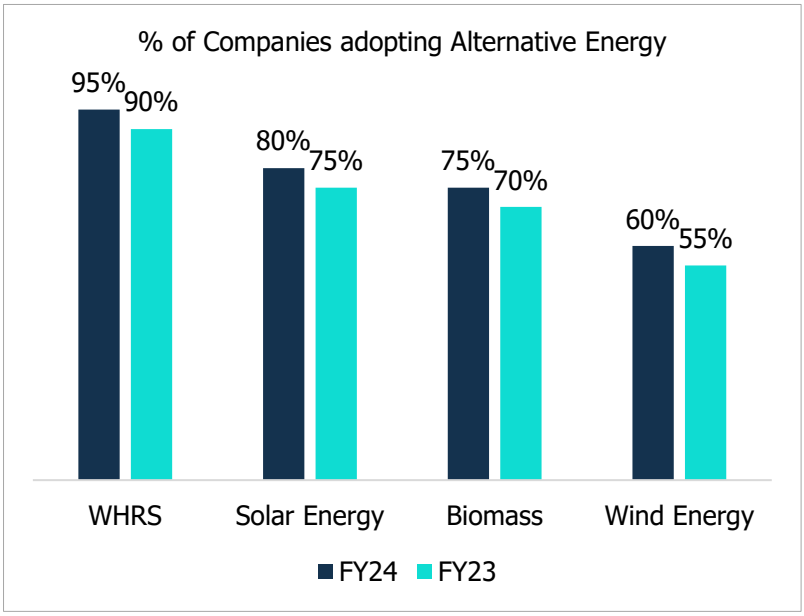
95% of companies using renewable energy in their operations in FY23 and FY24

renewable energy in their manufacturing during FY23 and FY24. This indicates a common industry effort towards sustainability and lowering carbon footprints. Using renewable energy reduces reliance on fossil fuels and supports global climate goals. It also reflects the industry's proactive support for India's net-zero emissions target, highlighting its part in national climate objectives and low-carbon growth pathways.

This transition's scale shows that renewable energy is now regarded as a central strategic priority, not just a peripheral effort, underpinning competitive advantage and regulatory adherence. Over time, this industry-wide change is likely to foster innovation in energy efficiency and speed up the decarbonization of cement production.

Alternative Energy Consumption Trends

CareEdge-ESG's evaluation of alternative energy adoption in India's cement industry indicates a steady increase across all categories from FY23 to FY24, demonstrating a growing commitment to sustainability and energy efficiency diversification.



According to CareEdge-ESG's data, WHRS remain the most commonly used alternative energy source, with adoption rising from 90% in FY23 to 95% in FY24. This predominance highlights WHRS's compatibility with cement production, as high-temperature kiln processes produce waste heat that can be effectively recovered and converted into usable energy power.

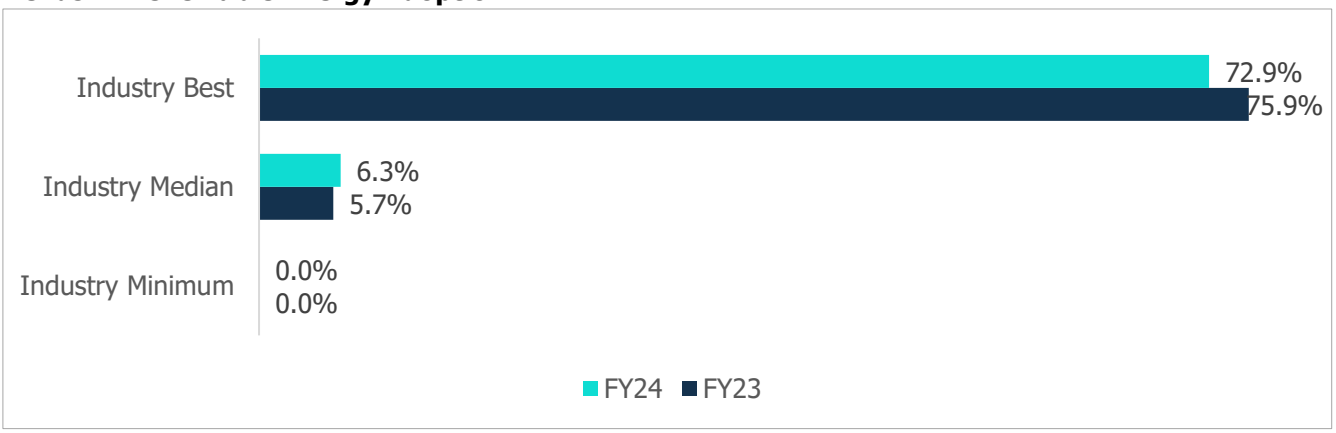
Solar energy adoption is increasing, rising from 75% in FY23 to 80% in FY24, reflecting greater investments by companies in solar infrastructure. This trend indicates efforts to reduce reliance on grid electricity and meet emissions reduction targets.

Biomass use is also notable, growing from 70% in FY23 to 75% in FY24. This shift underscores the industry's continuous move toward renewable, low-emission fuels to lessen dependence on traditional thermal energy and expand its renewable energy mix.

Wind energy, though less widely adopted, increased from 55% in FY23 to 60% in FY24. This suggests it remains an important but more challenging option, facing issues like supply variability and higher integration costs compared to WHRS and solar energy.

Overall, the data illustrates a positive momentum in India's cement industry's transition toward a more sustainable energy mix. The year-on-year growth across all energy sources indicates increased prioritisation of decarbonization, with particular emphasis on technologies that are directly compatible with process heat recovery and scalable onsite generation.

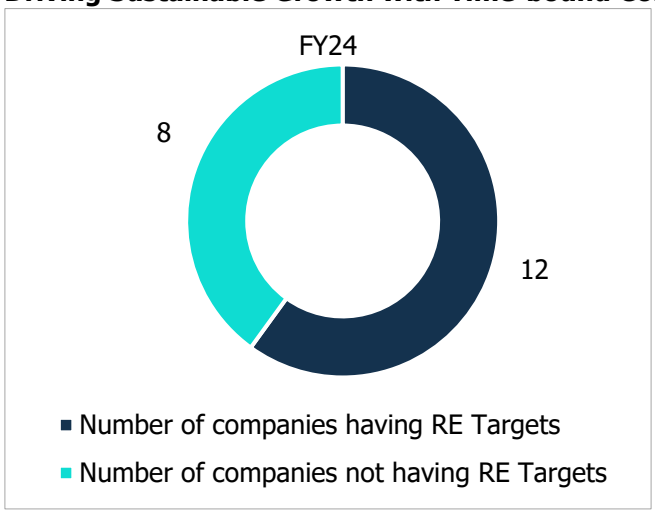
Trends in Renewable Energy Adoption

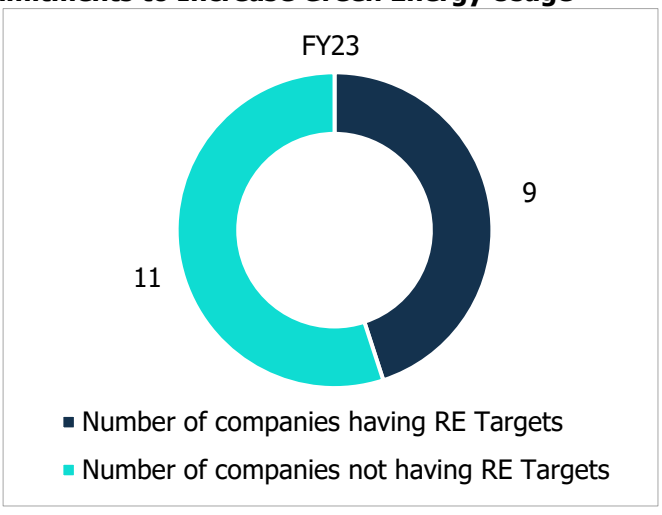


CareEdge-ESG's data highlights contrasting trends in renewable energy use within the cement industry between FY23 and FY24. The Industry Best performer maintained high renewable energy shares, dropping slightly from 75.9% in FY23 to 72.9% in FY24, which suggests that even companies with advanced renewable integration may face difficulties maintaining incremental gains annually. In contrast, all companies have policies or strategies to boost renewable energy adoption. However, the Industry Median remained modestly low, increasing from 5.7% in FY23 to 6.3% in FY24, indicating a slow but steady scaling-up of renewable use from a low starting point. The Industry Minimum stayed static at 0%, showing that one company has yet to begin transitioning to renewable energy sources. Nevertheless, this lagging company has near-term plans to incorporate renewables into its manufacturing processes, demonstrating its commitment to aligning with industry-wide sustainability shifts energy. The decline at the top end and simultaneous improvement at the median suggest a narrowing gap between leaders and the broader industry. This convergence could be driven by smaller firms initiating their renewable energy investments, thereby elevating the median. At the same time, early adopters face challenges sustaining higher renewable contribution as their overall energy consumption grows.

Overall, the data underscores that while incremental progress is evident across the industry, maintaining and growing the renewable energy share consistently requires continuous capacity addition, practical implementation, and a long-term transition strategy.

Driving Sustainable Growth with Time-bound Commitments to Increase Green Energy Usage





Another key metric for assessing renewable energy (RE) adoption is the companies' time-bound targets[7] to increase their share of renewable energy consumption.

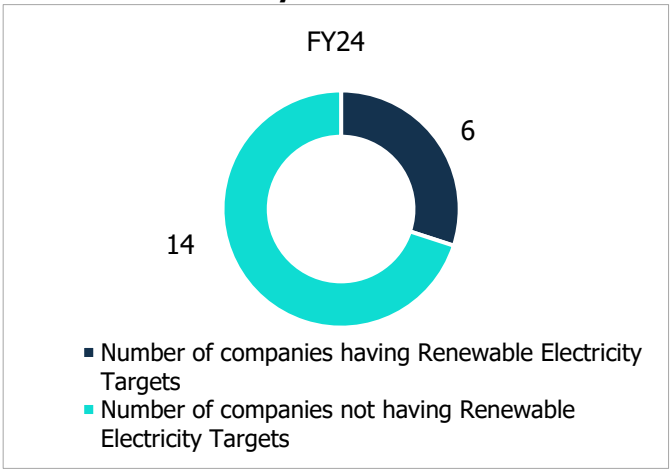
CareEdge-ESG's analysis reveals a significant shift in the strategic planning of renewable energy initiatives among Indian cement companies. By FY24, 12 companies have set specific, time-bound renewable energy targets to expand their use of clean energy, up from 9 in FY23, indicating a growing recognition of the importance of transitioning to greener sources.

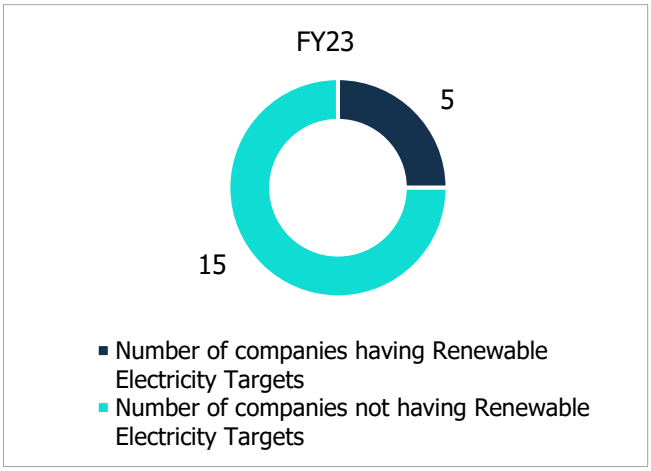
Meanwhile, eight companies in FY24 still lack defined RE targets, a slight improvement from 11 in FY23. Although the gap is closing, it highlights the ongoing need for sector-wide alignment and stronger commitment to comprehensive climate action.

The data shows most companies are incorporating RE targets into their broader sustainability strategies, such as commitments to net-zero emissions and alignment with Science-Based Targets initiatives (SBTi). Establishing clear, time-specific renewable energy goals not only signals strategic intent to lower environmental impact but also enhances operational resilience and resource efficiency.

This approach enables companies to optimise their energy mix, reduce risks from energy price fluctuations, and build greater trust with customers and stakeholders who value sustainability sourcing. As the market increasingly values climate leadership, such commitments position firms to capture emerging opportunities linked to green construction and low-carbon infrastructure development.

Renewable Electricity Commitments under Global RE100 Initiative





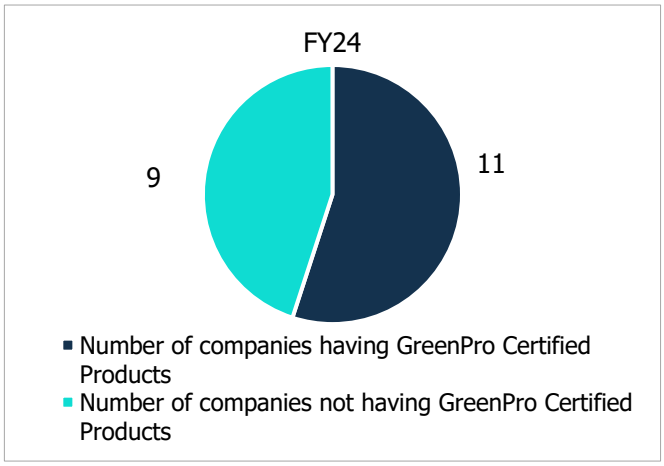
RE100 is the leading global initiative that unites companies committed to sourcing 100% of their electricity from renewable sources. By joining RE100, companies publicly pledge to transition to clean energy, demonstrating climate leadership and supporting global decarbonization goals. This initiative is regarded as a standard for corporate sustainability in the energy sector.

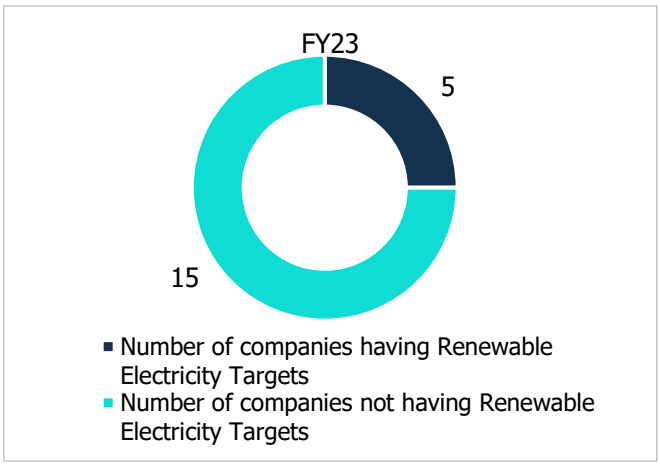
[7] CareEdge-ESG's data captures specific, measurable and time bound targets

CareEdge-ESG's analysis highlights the status of renewable electricity targets among Indian cement companies for FY23 and FY24. While the increase is modest- rising from 5 companies in FY23 to 6 in FY24- the significance lies in the nature of these commitments. Four of these six companies have made formal RE100 pledges to fulfil all their electricity needs with renewables. The other two companies have set similar goals within broader green energy initiatives, indicating a growing focus on decarbonising electricity use.

However, more companies- 14 in FY24 and 15 in FY23- still lack clear renewable electricity targets, underscoring the need for wider adoption of renewable energy strategies across the sector. As the industry works to cut substantial Scope 1 emissions and move toward net-zero targets, increased participation in initiatives like RE100 will be crucial to accelerating the clean energy transition in the cement industry sector.

Transition towards low-carbon construction products





GreenPro Certified Products are ecolabel products that meet defined environmental criteria across their life cycle, verified through a robust certification process. The GreenPro certification for products is administered by the Confederation of Indian Industry (CII), the authorised body responsible for evaluating and awarding the certification. The cement industry is among the key sectors covered under GreenPro certification, reflecting its importance in promoting low-carbon construction products.

CareEdge-ESG's data indicates a marginal yet positive shift in the adoption of GreenPro Certified Products within the cement industry, with 10 companies having certified products in FY23 and increasing slightly to 11 companies in FY24. This upward trend demonstrates a growing industry-wide commitment to adopt environmentally responsible practices and enhance product stewardship. This high adoption rate of GreenPro certification indicates that a significant majority of firms are proactively leveraging third-party validation to substantiate their environmental performance and align with emerging regulatory frameworks and market expectations.

In contrast, nine companies are yet to integrate GreenPro Certified Products into their portfolios in FY24, highlighting a notable gap in responsiveness to evolving customer requirements and the growing emphasis on green building materials. This disparity underscores the need for further standardisation and industry-wide convergence to ensure consistent sustainability benchmarks across the industry and collaborative efforts to drive a more uniform transition toward low-carbon construction solutions.

CareEdge-ESG believes that India's cement industry is making decisive strides toward a sustainable energy transition, with 95% of leading cement companies now utilising renewable energy, with a strong preference for waste heat recovery systems (WHRS), followed by solar, biomass, and wind. This reflects a growing industry-wide shift toward integrating clean energy into core operations. Despite differences in production scales, emission intensities remain comparable across quartiles, highlighting the limited financial and technical resources challenges in decarbonization.

CareEdge-ESG's analysis further shows a consistent rise in alternative energy adoption from FY23 to FY24, increased alignment with global initiatives such as RE100, and a rise in companies setting time-bound renewable energy targets, demonstrating strategic alignment with India's net-zero ambitions. Moreover, the sector is gradually embracing low-carbon construction through GreenPro Certified Products, with the number of companies offering such products increasing from FY23 to FY24, reflecting a strong industry-wide commitment to environmentally friendly manufacturing and product stewardship. While some companies remain in the early phases of this journey, the overall trend points to an industry steadily advancing toward a more sustainable, low-carbon, and climate-resilient future.

This transformation is poised to generate significant positive environmental impact by substantially reducing carbon emissions and lowering dependence on fossil fuels. Over time, these efforts will not only help the industry align with India's net-zero commitments but also foster innovation, operational efficiencies, and market differentiation through green products and cleaner operations. CareEdge-ESG believes that this momentum firmly positions the cement industry as a critical contributor to low-carbon growth, demonstrating a clear and accelerating commitment to sustainable energy transition in line with national decarbonization ambitions and global climate imperatives.

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