



Decarbonization Strategies
for
JK Cement Works, Buxar
A Unit of J.K. Cement Limited

<u>Project Details</u>	
Name of Project-	Grinding Cement Plant Cement Production (4.00 Million TPA),
Location	Villages: Menhmarara & Kant, Tehsil: Dumraon, District: Buxar (Bihar)

Table of Content

Table of Content.....	2
1. Executive Summary	3
2. Decarbonization Actions and Progress of the Group.....	4
a. Transition Towards Renewable Energy.....	5
b. Adopting Circular Economy	7
c. Energy Efficiency	8
d. Sustainable Mining	8
e. Water Stewardship	9
f. Biodiversity	10
g. Awards received by the Group in the field of Sustainability	11
3. GHG Emissions from the Proposed Grinding Cement Plant.....	12
4. Roadmap for Decarbonization.....	13
5. Conclusion.....	14

1. **Executive Summary**

JK Cement Ltd. is one of India's leading manufacturer of Grey and White Cement. Over four decades, the Company has partnered India's multi-sectoral infrastructure needs on the strength of its product excellence, customer orientation and technology leadership. JK Cement's operations commenced with commercial production at its flagship grey cement unit at Nimbahera, Rajasthan in May 1975.

As of 31st march 2024, The Company has installed Grey Cement capacity of 22.34 Million TPA. The company has capacity of 3.05 Million TPA of white cement and wall putty. JK White Cement is sold across 37 countries around the globe and the Company has a strong international presence with two subsidiaries, JK Cement Works Fujairah FZC and JK White Cement (Africa) Ltd.

M/s JK Cement Works, Buxar (A unit of JK Cement Limited) is proposing a Standalone Clinker Grinding Unit with Cement Production Capacity of 4.0 Million TPA along with installation of D.G. Set of Capacity 1250 kVA at Khasra Nos. 04, 05, 12 & others Villages: Menhmarara & Kant, Tehsil-Dumraon, District -Buxar, Bihar.

Capacity:

Table 1 Proposed Capacity of the project

S.no	Particular	Unit	Proposed Production Capacity
1	Cement (PPC & OPC/PSC/Blended Cement/ LC3)	Million TPA	4.0
2	DG Sets	kVA	1250
3	HAG (Diesel / Coal / Biomass)	MKcal/Hr	10

Introduction

As the world is facing with the challenges of climate change, the focus on sustainability has never been more critical. The Paris Agreement, a landmark international treaty, unites nations in a common cause to undertake ambitious efforts to combat climate change. Its primary aim is to limit global temperature rise this century to well below 2 degrees Celsius above pre-industrial levels, with a concerted effort to restrict the increase to 1.5 degrees Celsius. In line with these goals, the outcome of COP 26 emphasized the adoption of new green business norms,

including the commitment to achieving Net-Zero emissions. India, at the Glasgow Summit, pledged to reach Net-Zero by 2070.

Cement, an indispensable material for construction, plays a pivotal role in the development of emerging markets worldwide. However, the cement industry is also a significant contributor to global GHG (Greenhouse Gas) emissions, accounting for about 7% of the total and standing as the second-largest industrial emitter after the iron and steel sector. To mitigate the impacts of global climate change, the cement industry must reduce its carbon footprint.

The major key strategies for reducing GHG emissions in cement production include:

1. Improving energy efficiency: Enhancing operational efficiencies to reduce energy consumption.
2. Switching to lower-carbon fuels: Utilizing alternative fuels that emit less GHG.
3. Promoting material efficiency: Reducing the clinker-to-cement ratio and overall demand for cement.
4. Kiln Electrification and use of Green Hydrogen
5. Advancing process and technology innovations: Implementing Carbon Capture, utilization and Storage (CCUS) and other technological advancements.

These strategies are imperative and vital for aligning the cement industry with global climate goals and ensuring sustainable development.

This document outlines the decarbonization strategies of JK Cement Limited. The company will implement these as a part of commitment to reduce GHG emissions in the expansion project, thereby contributing to global efforts to combat climate change.

2. Decarbonization Actions and Progress of the Group

JK Cement's sustainability framework is built on four fundamental pillars: climate, waste as a resource, environment, and people and communities. These pillars align with our strategic interventions and support the United Nations Sustainable Development Goal 13 (SDG 13) on Climate Action. We are transitioning towards low-carbon products and technologies to contribute to India's net zero target.

Our key focus areas for decarbonization include reducing the clinker factor, replacing fossil fuels with alternative fuels and raw materials (AFR), switching to clean energy sources, improving energy efficiency, and expanding our green initiatives.

Table 2. JKCL’s Decarbonization Commitments and Progress

Commitment	Goal	Progress
Science-Based Targets initiative (SBTi)	Reduce Absolute Gross GHG emissions (Scope 1+2) from 680 kg CO ₂ /t cementitious material to 532 kg CO ₂ /t cementitious material (~21.7%) by FY30 from the FY20 base year. Validated by SBTi.	Reduced Absolute Gross GHG emissions (Scope 1+2) by 17.2% (563 kg CO ₂ /t) in FY24, surpassing the FY25 SBTi target.
United Nations Framework Convention on Climate Change (UNFCCC)	Joined the UNFCCC’s “Race to Zero” campaign. Reduce specific Net Scope 1 emissions (excluding CPP & AFR) by 19.8% from 580 kg CO ₂ /t cementitious material in FY20 to 465 kg CO ₂ /t cementitious material by FY30.	Reduced Net Scope 1 emissions (excluding CPP & AFR) by 11.8% (512 kg CO ₂ /t) in FY24.
UN Energy Compact Commitment	Increase the proportion of green power in our energy mix from 19% in FY20 to 75% by FY30.	Increased the share of renewable power in our energy mix to over 50%.

a. Transition Towards Renewable Energy

JKCL committed to the UN-Energy Compact in collaboration with the Ministry of New and Renewable Energy (MNRE) to drive progress towards achieving United Nations Sustainable Development Goal 7 (SDG 7) on Affordable and Clean Energy. SDG 7 aims to ensure access to affordable, reliable, sustainable, and modern energy for all. By increasing our share of green energy, we directly contribute to reducing our carbon footprint and advancing global efforts to combat climate change.



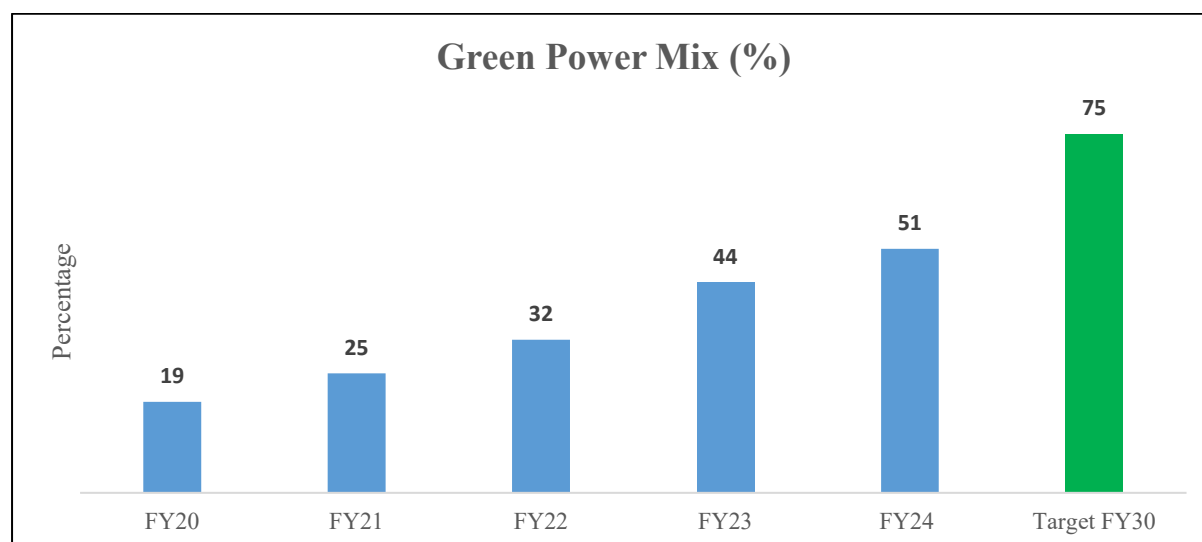
5MWp Solar Plant at J.K. Cement work- Nimbahera, Rajasthan

Our target is to increase the proportion of green energy in our overall energy mix from 19% in the base year FY20 to 75% by FY30. As of FY24, we have successfully increased our green energy mix to 51%. This significant progress is linked to our decarbonization strategy, as green energy sources such as wind, solar, and waste heat recovery systems (WHRS) produce little to no greenhouse gas emissions compared to fossil fuels.



Waste heat recovery system of Muddapur

We are further investing in expanding the capacity of our existing WHRS, installing new WHRS systems, and increasing the consumption of renewable energy (RE). These initiatives are crucial for reducing our dependency on fossil fuels, thereby lowering our overall GHG emissions and enhancing our sustainability profile.

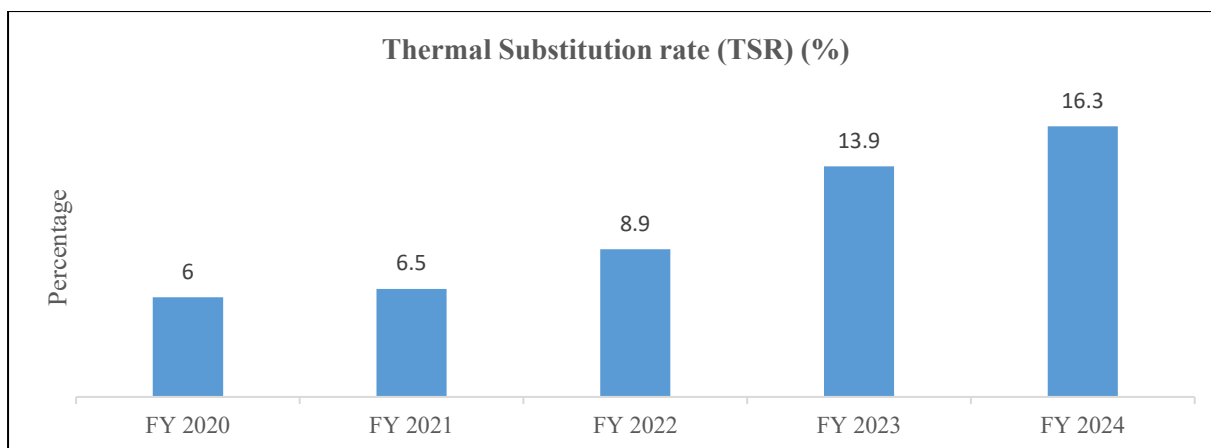


Graph 1: Progress in Green Power Mix (%) from FY20 to FY24 against our targets for FY30

b. Adopting Circular Economy

As part of our commitment to conserving natural resources and reducing carbon emissions, JK Cement Limited has adopted a circular economy approach. This involves reducing the clinker factor by incorporating industrial waste materials such as fly ash and slag. We have successfully reduced the clinker factor from 70.3% in the base year FY20 to 63.6% in FY24. Lowering the clinker factor directly reduces the carbon footprint of cement production, as clinker production is the most carbon-intensive part of the process. We are conserving our natural resources, and also significantly lower the carbon intensity of cement production process.

In addition to resource conservation, we have embraced the strategy of converting waste to energy. This is achieved through increasing our waste utilization rate, known as the Thermal Substitution Rate (TSR). As of FY24, we have raised our TSR to 16.3% and are targeting to achieve a 35% TSR by FY30. By converting waste materials into energy, we reduce our reliance on fossil fuels, thereby decreasing overall carbon emissions.



Graph 2: Progress in Thermal Substitution Rate (TSR)

c. Energy Efficiency

JK Cement Limited is committed to enhancing energy efficiency as a crucial part of decarbonization strategy. On the energy conservation front, we have undertaken significant upgrades to our equipment and systems. This includes replacing outdated pre-heaters, grinding systems, and compressors with state-of-the-art, highly energy-efficient alternatives such as advanced pre-heaters, Vertical Roller Mills (VRM), and Roller Presses for grinding, as well as air-cooled screw compressors, energy-efficient motors, and Variable Frequency Drives (VFD). Through these modern, energy-efficient equipment, we have increased our productivity and reduced our operational costs. These upgrades have enabled us to achieve substantial reductions in specific power consumption, decreasing from 73.6 kWh/t cement in the base year FY20 to 64.3 kWh/t cement in FY24. This achievement surpasses our FY25 targets, highlighting our commitment to continuous improvement in energy efficiency.

d. Sustainable Mining

JK Cement Limited is committed to implementing sustainable mining practices as a key component of our environmental stewardship and decarbonization strategy. We have adopted some of the world's best sustainable mining practices, ensuring that our operations are environmentally responsible and socially beneficial. Our dedication to sustainable mining has been recognized, with our mines being awarded a prestigious 5-star rating. These practices have helped us to lower land degradation, reduces water and air pollution, and promotes the efficient use of resources. This recognition reflects our commitment to minimizing environmental impact, conserving natural resources, and promoting biodiversity.



Halki Mines of Muddapur Integrated Plant

e. Water Stewardship

Water is a finite and vital natural resource, and JK Cement Limited is committed to optimizing its use across our operations. We have significantly improved our water positivity, increasing from 3.2 times in the base year FY20 to 4.5 times in FY24. This improvement has been achieved through the adoption of water-efficient technologies and practices, such as replacing water-cooled condensers with air-cooled ones, thereby reducing water usage at all our power plants. Additionally, we have increased aquifer recharge efforts both within and beyond our operational boundaries.



Rain Water Harvesting (RWH) in Mine Pit of Muddapur Integrated Cement Plant

f. Biodiversity

JK Cement Limited is dedicated to preserving and enhancing biodiversity as part of our environmental stewardship. We have adopted the Miyawaki method to create dense, self-sustaining ecosystems that enhance dust absorption, temperature regulation, and soil fertility, while also improving water retention. This method, combined with our Beema Bamboo plantations developed through tissue culture for rapid growth and high yield, underscores our commitment to sustainable business practices.

We have also developed a biodiversity park in Chittorgarh District (Rajasthan), serving our efforts to conserve regional flora and fauna and act as a natural carbon sink. By FY24, we have successfully planted over 1.5 million saplings. This green drive has offered various ecosystem services such as soil and water conservation, and increased climate resilience, benefiting both the environment and the community.



Miyawaki Plantation & drip irrigation in one of our site

g. Awards received by the Group in the field of Sustainability

JKCL have recognized by various organization in field of sustainability. In our pursuit of delivering sustainable green products, our blended cement received the prestigious CII GreenPro Ecolabelling Accreditation in FY22. This accreditation recognizes our efforts in producing environmentally friendly products that contribute to the sustainable development. JK Cement Limited is dedicated to achieving net zero emissions by adopting emerging technologies to replace fossil fuels with sustainable green fuels, transitioning towards green energy, and implementing techno-economical solutions. These initiatives reflect our aspiration to lead in sustainability and environmental responsibility. The table includes all the awards and recognitions received by JK Cement units.

Table 3: Awards and Recognitions of JK Cement

<u>Unit</u>	<u>Award</u>	<u>Organisation</u>
Muddapur, IU	GreenCo Platinum Rating	Confederation of Indian Industry (CII)
	Excellent Energy Efficient Unit in 24th National Award for Excellence in Energy Management (Sixth consecutive time)	CII
	National Leader in Energy Efficiency in 24th National Award for Excellence in Energy Management (Fourth consecutive time)	CII
	Overall Excellence Award for Halki & Muddapur Mine during 12th Mines	IBM

	Environment & Mineral Conservation Week	
	Four individual awards for Halki Mines & Five individual awards for Muddapur Mines	IBM
Mangrol, IU	GreenCo Gold Rating	CII
	Excellent Energy Efficient Award & National Energy Leader in 23rd National Award for Excellence in Energy Management	CII
	Energy Conservation - Excellence Award	CII
	Water Positivity/Water Aspiring Scope-1 Certified	CII
Nimbahera, IU	GreenCo Silver Rating	CII-Sohrabji Godrej Green Business Centre
	National Award for Excellence in Energy Management	CII
	Blue Rating Pilot Project (first in Cement Industry)	CII
	Mine Environment & Mineral Conservation Week Award	IBM
Balasinor, GU	Excellence in Energy Management	CII
Jharli, GU	Excellent Energy Efficient Unit Award	CII
	Best Energy Efficient Organization	CII
Gotan, IU	IConSWM – CE Excellence Award in Co-Processing for achieving TSR	13th International Conference on Waste Management & Circular Economy and IPLA Global Forum
	Appreciation Award to Manufacturing Head for exemplary contribution in Co-Processing	13th International Conference on Waste Management & Circular Economy and IPLA Global Forum

3. GHG Emissions from the Proposed Grinding Cement Plant

Understanding and managing GHG emissions is crucial for reducing the environmental impact of our cement production. The GHG calculations are assumed

& performed in accordance with guidelines provided by the Global Cement and Concrete Association (GCCA) and the European Cement Research Academy (ECRA). These organizations provide standardized methodologies and best practices for accurately measuring and reporting GHG emissions in the cement industry.

The Scope-1 Emissions are from fuel burning (HAG) within the plant and company vehicles. The source of Scope-2 Emissions is from the purchased of electricity.

Table 4: Source and Calculation of Scope 1 emissions

Conventional fossil fuel (Scope - 1) Emission						
Total Conventional fossil fuel	Quantity (t/yr)	Calorific Value (kcal/kg)	Calorific Value (GJ/t)	CO ₂ emission factors per lower heating value (kgCO ₂ /GJ)	CO ₂ emission (kgCO ₂ /t)	Total CO ₂ emission (Tonnes/Yr)
Coal	71280	4000	17	96	1632	116328.96
Diesel oil	3394	10500	44	74.1	3260.4	11065.798
Total Scope - 1 emission						127394.76

Table 5: Source and Calculation of Scope 2 emissions

Total Power Information (Scope - 2) Emission				
External Power Requirement	Power requirement (MWh)	Total Power (MWh/yr)	CO ₂ emission factors per MW (kgCO ₂ /MWh)	Total CO ₂ Emission (Tonnes CO ₂ /Yr)
Power Requirement	20	175200	716	125443.2
Total Scope - 2 emission				

Total CO₂ emission (Tonnes CO₂/Yr)	252837.96
Scope - 1 (TonnesCO₂/Yr)	127394.76
Scope - 2 (TonnesCO₂/Yr)	125443.20

4. Roadmap for Decarbonization

To decarbonize our GHG emissions, we are aligning our strategy with the Government of India's Net-zero target of 2070 and the Science Based Targets initiative (SBTi) & GCCA recommendation of 2050. At our JK Buxur Grinding Unit, the anticipated GHG emissions primarily arise from company vehicles, fuel combustion, and purchased electricity. To reduce these emissions, we plan to

gradually replace power purchased from the State Electricity Board with renewable energy sources. This will eliminate our Scope-2 emissions.

Table 6: Modelled nos. based on the latest Well Below 1.5 Degree Scenario Analysis of SBTi tool

	Base year (2024)	Target year (2035)	% SBT reduction
Company Scope 1 emissions (tCO ₂)	1,27,394.76	1,27,881.40	-0.38%
Company Scope 2 emissions (tCO ₂)	1,25,443.20	36,283.63	71.08%
Company Scope 1+2 emissions (tCO ₂)	2,52,837.96	2,00,669.07	20.63%
Company Scope 1 emissions intensity (tCO ₂ /t)	0.032	0.032	-1.36%
Company Scope 2 emissions intensity (tCO ₂ /t)	0.031	0.009	70.79%
Company Scope 1+2 emissions intensity (tCO ₂ /t)	0.063	0.051	19.86%

Note: Scope 1+2 intensity targets are modeled against a combined sector convergence pathway, therefore these targets will vary slightly from the sum of Scope 1 and Scope 2 intensity targets.

Table 7: Alignment with Net Zero GHG Emission

Alignment with Net Zero GHG Emission			
Year	FY2034	FY2050	FY2070
Biomass/ Clean Fuel/New Drying system and EV	25%	50%	100%
RE	75%	100%	100%
Scope-1	95545.31	63697.38	0
Scope-2	31360.75	0	0
Total	126906.06	63697.38	0

To reduce our remaining Scope-1 emissions, we plan to adopt the following sustainable practices:

- Replace conventional fuels with alternative fuel resources to lower carbon emissions during the production process
- Replace Ordinary Portland Cement (OPC) with blended and composite cements that have a lower clinker factor, thus reducing the carbon emissions from the cement production process.
- Gradually replace diesel-powered fleets with electric vehicles (EVs) for internal transportation as EV technology develops and becomes more accessible.

5. Conclusion

The Indian government places a strong emphasis on infrastructure development as a means to boost economic growth. Recognizing its pivotal role, the government has initiated policies to ensure the creation of world-class infrastructure in a timely manner. In alignment with this vision, we plan to implement the best available technologies across all aspects of our operations. This includes the use of alternative

fuels and raw materials, the adoption of renewable energy, and various energy efficiency measures.

To address this, we are committed to implementing sustainable practices such as gradually increasing the share of renewable energy in time manner by 2034 we will have 75% source, reducing process emissions through the use of blended and composite cements, fuel replacement, and transitioning to electric vehicles. we will net zero by 2070 or by 2050 depends on the technological changes in the sector.

However, These measures will significantly lower our emissions, helping us meet regulatory requirements and lead the way in sustainable cement production.

JKCL aims to not only mitigate its GHG emissions but also contribute positively to global climate action. Through these strategic initiatives, we are setting a new standard for the cement industry in India, aligning our operations with national infrastructure goals and global sustainability efforts.

JKCL is a member of prestigious global organisation, and our climate-related targets are aligned and validated by them.



SCIENCE
BASED
TARGETS

DRIVING AMBITIOUS CORPORATE CLIMATE ACTION

SBTi

- Reduction of Sp. Gross (Scope 1+2) CO₂ emissions from **680** to **532 kg CO₂/t** cementitious material (~21.7% reduction) by **2030** from base year 2020 – including Scope-1 & 2.
- Targets approved in 2023
- In FY 25 (Q1), we have reduced Sp. Gross (Scope 1+2) CO₂ emissions to **567 kg CO₂/t** cementitious material from base year 2020.



Global Cement and Concrete
Association

Scope-1 carbon emissions by 19.8% from **580** in base year FY20 to **465 kg CO₂/t** cementitious material by FY30

specific Net Scope-1 Carbon Emissions to **519 kgCO₂/t** cementitious material (~19% reduction) from base year 2020.



United Nations



UN Energy Compact

- Increase Green Power Mix from **19%** (FY2020) to **75%** (FY2030)
- Submitted to Ministry of New & Renewable Energy, Govt. of India.
- In FY25 (Q1), We have increased Green Power to **53%** as compared to base year 2020.

JKCL collaborate with these National organizations for Decarbonisation strategy:



CEMENT
MANUFACTURERS
ASSOCIATION

Cement Manufactures
Associations



National Council for Cement and Building Material



Global Cement and Concrete
Association

GCCA India



Confederation of Indian Industry

Confederation of Indian
Industry

JKCL's Performance on Key Decarbonization KPIs

KPI	Sp. Gross (Scope 1+2) CO ₂ emission (kg CO ₂ /t cementitious material)	Net Scope-1 CO ₂ emission (kg CO ₂ /t cementitious material)	<u>Levers Identified for Decarbonisation</u>		
			 Green Power Mix (%)	 Thermal Substitution Rate (%)	 Clinker Factor (%)
Base Year 2020	680	580	19	6	70.3
Q1- FY25	567 Reduced by 16.6% from 2020	519 Reduced by 10.5% from 2020	53 Increased by 34% from 2020	15.5 Increased by 9.5% from 2020	64.5 Reduced by 5.8% from 2020
Target Year 2030	532	465	75	35	65

We report our performance in the Integrated Annual Report (accessible on our website) and in various ESG ratings, including DJSI (Dow Jones Sustainability Index), Carbon Disclosure Project (CDP), and others..

Link of our latest Integrated Report 2024- <https://www.jkcement.com/wp-content/uploads/2024/06/JK-Cement-FR2024.pdf>

Note-

1. Gross GHG emissions: Inclusive of all emissions of Scope-1 & 2; Net GHG emissions: Only Scope 1 (without Captive Power Plant, & AFR emissions)
2. Scope 1 emissions refer to direct greenhouse gas emissions from sources owned or controlled by an organization, such as fuel combustion in boilers or vehicles.
3. Scope 2 emissions are indirect emissions associated with the consumption of purchased electricity, steam, or heating. These emissions arise from the generation of purchased energy but are not directly emitted by the reporting organization

JKCL has been recognized with several awards for excellence in sustainability.

NIMBAHERA

- 1 GreenCo Silver Award by the CII-Sohrabji Godrej Green Business Centre
- 2 National Award for Excellence in Energy Management 2023
- 3 Industrial growth and FICCI award for Excellence in Maintenance Systems
- 4 CII has started a pilot project for Blue Rating at Nimbahera Plant, it is the first time in the cement industry (pre-assessment completed in December 2023)
- 5 Mine Environment & Mineral Conservation Week Award 2023 by Indian Bureau of Mines (IBM)



MANGROL

- 1 Excellent Energy Efficient Award and National Energy Leader at the 23rd National Award for Excellence in Energy Management
- 2 Energy conservation -Excellence award from CII
- 3 Water positivity/Water aspiring Scope-1 certified by CII



MUDDAPUR

- 1 Excellent Energy Efficient Unit for the sixth consecutive time at 24th National Award for Excellence in Energy Management conducted by CII
- 2 National Leader In energy efficiency for the fourth consecutive time at the 24th National Award for Excellence in Energy Management conducted by CII
- 3 Bagged Overall Excellence Award for Halki and Muddapur mines during the 12th Mines Environment & Mineral Conservation Week 2022-23 and (four individual awards for Halki Mines and five individual awards for Muddapur mines)



Mines Safety Week Awards
Work by JK Cement Works,
Muddapur &
Halki Limestone Mines

HALKI LIMESTONE MINES
Explosives - First Prize
Safety Commitment and
Safety Organisation - First Prize

MUDDAPUR LIMESTONE MINES
Workforce Awareness - First Prize
Localisation Training - First Prize

GOTAN

- 1 Rajasthan State Safety Award – 2023 Gotan for High Standards of Competence and Compliance of OHS & Welfare provisions under the Factories Act 1948 and rules
- 2 Achieved IConSWM – CE Excellence Award 2023 in Co-Processing for achieving TSR in 13th International Conference on Waste Management and Circular Economy and IPLA Global Forum 2023 (November 2023)
- 3 Gotan Limestone Mine achieved the First Overall Performance prize in the "C" category
- 4 Best Employer Award -2023 from The Employers Association of Rajasthan in the large-scale industry category (Cement group)
- 5 Appreciation Award to Manufacturing Head for exemplary contribution in Co-Processing, presented in 13th International Conference on Waste Management and Circular Economy
- 6 Dhanappa Mines achieved the Second prize in the "B2" category



BALASINOR

- 1 Excellence in Maintenance System was presented by FICCI for Appreciation of Good Practices in Plant Management System
- 2 Excellence in Energy Management, presented by CII



JHARLI

- 1 Excellent Energy Efficient Unit Award, presented by CII
- 2 Best Energy Efficient Organisation