



# MINIMISING OUR ENVIRONMENTAL IMPACT

To ensure that we continue to meet the nation's development needs and reduce the environmental impact of our operations, we have committed ourselves to net positive outcomes and ultimate recovery of the environment. While we are innovating on sustainable production methods, and concrete use and applications, our time-bound strategy is directed at restricting resource use, reducing CO<sub>2</sub> emissions, efficiently manage waste and minimise & replenish water.

### FY 2022-23 Highlights

**11,381 T**

Of CO<sub>2</sub> emissions avoided due to the use of solar energy at Nandyal and Salboni plants

**1,56,952 m<sup>3</sup>**

Harvested rainwater consumed

**8.1%**

Thermal substitution rate

**7.3 MnT**

Waste derived resources used

**206 kg/T**

Of cementitious material net CO<sub>2</sub> emissions intensity (Scope+Scope 2)

**78 Litre**

Water consumption per tonne of cementitious material

### Ensuring environmental compliance and awareness

Ensuring compliance is critical for the seamless operations of our plants. We strictly adhere to relevant regulations governing air quality, water management, and waste disposal, both at the local and national levels. Rigorous monitoring ensures that our performance across these parameters remain consistently within permissible limits. In FY 2022-23, there were no instances of non-compliance with environmental statutes at any of our plants. However, we paid fine of ₹10 Lakh for an earlier non-compliance of FY 2020-21. While there were a few show-cause notices, these were effectively addressed. Additionally, we have taken proactive steps by discontinuing the use of single-use plastics.

### CASE STORY



## CELEBRATING WORLD ENVIRONMENT DAY 2022

We enthusiastically marked World Environment Day in 2022 with a blend of passion and targeted action. Aligned with the theme, 'Only One Earth', our activities reflected the motto of 'Living sustainably in harmony with nature'. To cultivate awareness not only among our employees but also among the future generation, particularly children, a series of engaging competitions were organised. The event garnered a remarkable response, with nearly 25% of our employees actively taking part, and thus underscoring our collective commitment to environmental awareness and sustainability.



## NATURAL CAPITAL

### Partnering for Net Zero concrete

As a member of the Global Cement and Concrete Association (GCCA), we are committed to GCCA's visionary roadmap for achieving Net Zero concrete by 2050. Over the past decade, we have quadrupled our production while halving our emissions by high clinker substitution, particularly with slag. Currently, more than 90% of our product portfolio is slag-based, with two-thirds of our raw materials sourced from by-products and waste materials.

To achieve Net Zero emissions, we are implementing strategies such as clinker substitution, using alternative fuels and raw materials, and increasing clean and green sources in our energy mix. We blend clinker with supplementary materials like blast-furnace slag to produce blended cement, reducing carbon emissions. We aim to increase our use of alternative fuels and raw materials to over 30% by 2030. Additionally, we are progressively incorporating solar power plants, Waste Heat Recovery Systems (WHRS), and renewable energy sources, targeting 50% renewable power by 2030. Our grinding plants also utilise advanced technologies, prioritise energy productivity, and produce high-quality blended cement products with superior properties.

Targetting for

# 60%

Renewable power by 2030

### Climate change and energy management

As part of our climate action strategy, we are progressively shifting towards the use of alternate fuels and raw materials, installing solar and wind power plants, Waste Heat Recovery Systems (WHRS), and sourcing renewable energy through Power Purchase Agreements (PPA).

As per SLL, we have taken a target of reducing our CO<sub>2</sub> emission intensity (scope1+2) by 15% by FY26 from the FY21 baseline. For reducing our scope 3 emissions and for electrification our fleet, we have ordered 5 EV trucks for raw material transports which will be delivered in FY24.



### Latest technology and energy-efficient processes

#### Clinker substitution

We continue to use industrial waste, such as blast furnace slag/fly ash, to substitute clinker in the production of cement or cementitious products; more than 90% of our products are slag-based.

#### Using alternate fuel

Our clinker plants at Nandyal and Fujairah conserve natural resources such as coal and pet coke via co-processing of alternate fuels.

#### Waste heat recovery

We are prioritising WHRS, which reduce the consumption of coal/diesel, while utilising clinker plant waste hot gases for slag drying. The 9 MW WHRS at Shiva Cement meets almost 70% of its energy needs.

#### Shifting towards renewable energy

We have installed 5.5 MW solar plant at the Nandyal unit and 3.5 MW at our Salboni unit, which are helping us decarbonise our footprint.

### Collaborating for change

We are collaborating with various organisations to give further impetus to our sustainability journey. These partnerships serve as platforms for networking, learning, and propelling businesses towards a low-carbon future. As part of our decarbonisation strategy, we are part of the following:

- ▶ GCCA 2050 Cement and Concrete Industry Roadmap for Net Zero Concrete
- ▶ Part of all the three campaigns of RE100, EP100 and EV100 of The Climate Group, the first company in the sector to make such a commitment
- ▶ Signatory to the UN Energy Compact, a voluntary commitment of action with specific targets and timelines to achieve SDG7 in line with the Paris Agreement on Climate Change
- ▶ Signatory to the Global Framework Principles for Decarbonising Heavy Industry, which provides clear steps to reduce emissions in heavy industries across the world to limit global warming to 1.5°C
- ▶ Member of UNIDO's Industrial Deep Decarbonisation Initiative's (IDDI) advisory group since 2022
- ▶ Signatory to CII's Climate Charter and a member of CII Climate council since 2022
- ▶ Member of Development Council for Cement Industry (DCCI), set up by Government of India in 2021
- ▶ Committed to Science Based Targets initiative (SBTi) since 2022
- ▶ Member of CII's India Business and Biodiversity Initiative (IBBI) and IUCN's Leader for Nature programme, both promote our efforts towards biodiversity conservation and emission reduction



Confederation of Indian Industry



FOR MEMBERSHIP OF THE CLIMATE GROUP



INDIA BUSINESS & BIODIVERSITY INITIATIVE

# EMISSIONS

## Emissions management

The primary sources of our GHG emissions are cement production and transportation of raw material and finished products. Our foremost goal is to manufacture products with a low carbon footprint. We are already leading the decarbonisation journey of the sector, with an emission intensity that is only one-third of the global average and 36% of the national average.

During FY 2022-23, our Scope 1 net emission intensity gradually decreased from 219.7 kg/T to 173.3 kg/T of cementitious material, primarily due to lesser clinker production at Nandyal plant.

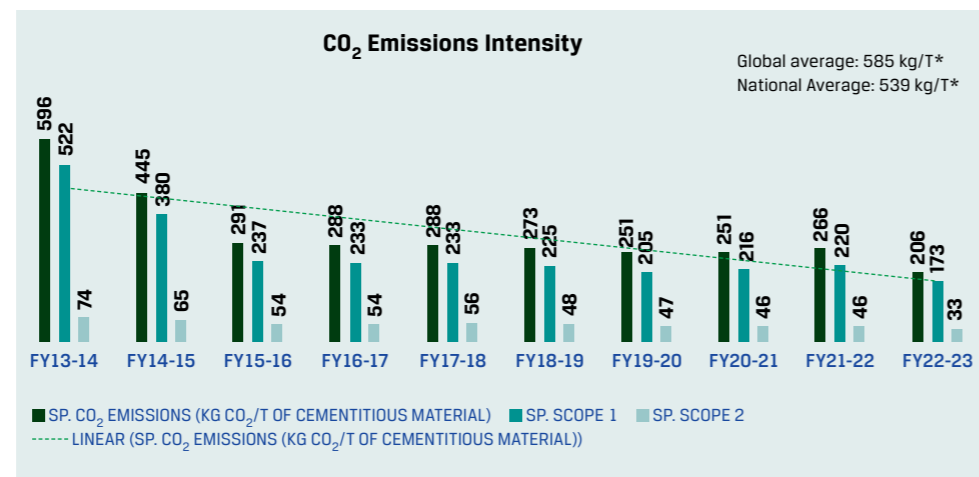
Our Scope 2 emission intensity underwent a gradual reduction from 46 to 33 kg/T. Several strategies have played a role in reducing our CO<sub>2</sub> footprint reduction.

### Emissions per category (%)



## Carbon footprint historical performance

In the past 10 years, we have reduced our carbon emission intensity by more than half.



\*Source: GCCA GNR2021

## Other emissions

We acknowledge our responsibility to safeguard air quality. Emissions from our manufacturing operations encompass dust, nitrogen oxides (NOx), and sulfur oxides (SOx). The primary sources of dust emissions are cement production stacks and fugitive emissions from quarrying, material transfer, loading/unloading, and open material storage at a few manufacturing sites. Combustion of fuel and raw materials produces SOx and NOx emissions.

To ensure stringent control, we have installed continuous emission monitoring systems (CEMS) and ambient air quality assessments across our plants. We meticulously track stack and fugitive emissions of dust (PM10, PM2.5), SO<sub>2</sub> and NOx. Our commitment to comply with environmental standards is unwavering, and we adhere to all pertinent local and national emission regulations.

We have been consistently enhancing our performance and management benchmarks for air quality control. It is noteworthy that we refrain from emitting any ozone-depleting substances (ODS) during the cement production process. Other auxiliary emissions from our operations are nearly negligible. Our kiln stack emissions are documented, with a single kiln at Nandyal, accounting for 100% of reported emissions.

Our new kiln at Shiva Cement, which began operations in early 2023, is also connected with CEMS. We will be reporting the data of this from next year.



## Introducing Green-Crete - our low carbon concrete

In FY 2022-23, we launched our most environmentally friendly range of ready-mix concrete – Green Crete. Our GreenCrete is a low-carbon concrete that effectively reduces CO<sub>2</sub> emissions by 30-45%. The range comprises two varieties: JSW Green Crete Smart and Green Crete Ultima.

By incorporating GGBS as partial substitutes for OPC, Green Crete ensures sustainable construction practices. Furthermore, Green Crete Ultima integrates granulated blast furnace slag (GBFS) as a partial replacement for sand. As part of our commitment to transparency, we have also launched a Carbon Calculator, allowing customers to gauge their contribution to CO<sub>2</sub> emission reduction when opting for Green Crete.

### Why Green Crete?

- Substantial CO<sub>2</sub> reduction
- High strength
- Excellent durability
- Conservation of natural resources – limestone, water, energy, sand
- Contributes to a circular economy using by-products
- Green rating, which helps in getting more FSI and
- Green certifications

## ENERGY

## Energy management

Our derive our power supply mainly from the grid and through third parties, with a captive power plant at Salboni. We are actively expanding our utilisation of solar power and waste heat recovery across our plants.

**405.7 million units**

Total electricity consumption

**5,085 TJ**

Total thermal energy consumption at kiln

**3.182 GJ/T**Of clinker-specific  
Thermal Energy**52.4 Kwh/T**Of cementitious materials  
Specific Electrical Energy

## Use of renewable energy

Continuing our efforts towards renewable energy consumption, we elevated our renewable energy share to 3.9 % from 3.6 % in FY 2022-23, driven by increased renewable power use at Salboni and Nandyal. We are aiming to further improve this share in the years to come.

**5.5 MW**Solar power plant at the  
Nandyal unit**3.5 MW**Solar power plant at the  
Salboni unit**16 million units**Solar power consumption at  
Nandyal and Salboni plants**~4%**Renewable Energy  
portfolio

## Energy efficiency

With increased usage of alternate fuels, we observed a rise in our thermal substitution rate (TSR) from 7.1% to 8% last year, owing to increased consumption of industrial waste, plastics/RDF waste, and biomass waste at our Nandyal plant. Our energy sources encompass industrial waste, including pharmaceutical hazardous waste, plastic waste, carbon black, and biomass waste like ground nuts and rice husk. However, in FY 2022-23, our specific thermal energy increased by 2% vis-à-vis last year.

**36,03,904 kWh/annum**

Energy savings across all five plants

**2,559 T/annum**CO<sub>2</sub> emissions avoided due to multiple energy efficiency measures

## Initiatives to improve energy efficiency

Every year, we strategise and implement initiatives to increase our energy efficiency. These sustainable energy solutions help us in reducing emissions and fuel cost.

## Salboni

Exclusive grinding of OPC (Self and Sale) by RP+BM combination, thus reduction in overall SPC by 1.82 Unit/MT

Interlocks revised to avoid idle running in RP and Coal-Mill circuit

Replacement of conventional fixtures with LED light at street light

Process water spray extraction pump connection changed to raw water instead of filtered water tank.

Removal of 02 nos (22 Kw) secondary bagfilter fans from Packing Plant

Modifications at Packing Plant blower lines

## Vijaynagar

RP main bagfilter DOL to VFD

RP Unit-2 HAG coal conveyor blower DOL to VFD

LC-1 lighting operation through DCS

VRM bag house discharge air slide standby motor kept off

Admin building air conditioner cassette indoor units (5 Nos) kept off in open space area

## Dolvi

Replacing of water-cooled air conditioning units to air-cooled air conditioning units.

Installation of door-limit sensors to eliminate idle electrical loads in cable cellars.

Replacing of Bag filters starters from DOL to VFD.

Optimisation of the supply voltages to within energy economy zones for both medium and low voltage applications within the plant. ( Using in A-shift Zones of MSEB )

## Jajpur

Solar light installation

Packer radial/tangential belt joint for long belt

Drive installation

Enhancing our  
clean energy  
portfolio

We are progressively increasing our adoption of clean and green power by utilising electricity generated through WHRS and renewable energy accessed through PPAs. In the previous year, around 4% of our power came from clean sources, which will rise to approximately 20% in FY 2023-24. Our solar power capacity, managed by JSW Energy, stands at 26.5 MW, complemented by WHRS of 21.3 MW. This has resulted in an aggregate non-fossil energy capacity of nearby 48 MW with plans for further expansion in the future.

**20%**

Projected percentage of power accessed from clean sources in FY 2023-24

# RAW MATERIALS AND WASTE

## Circular economy

**We have adopted a circular approach to conserve resources and minimise our carbon footprint. Our production leverages industrial waste like slag to lower clinker factor and carbon emissions.**

### Contributing to circular economy

Our inception was driven by the Group's vision to repurpose waste from the steel industry to create eco-friendly slag-based cement. This core objective firmly in place, our ambition now extends to broadening our waste utilisation efforts to encompass various sectors across JSW Group industries.

# 30%

TSR by 2030

### Using industrial waste to produce blended cement

We produce Portland Slag Cement (PSC) and composite cement with waste materials from various industries, such as fly ash, slag and gypsum. These materials act as substitutes for naturally occurring limestone, thus contributing to a reduced reliance on natural resources.

### Alternate fuel from waste

We utilise a combination of industrial waste, including hazardous waste from pharmaceuticals and plastic waste, along with natural materials such as plastic waste, RDF pulverised nut, rice husk, dolochar, and carbon black, as energy sources. This helps us in emission reduction, curbing natural resource consumption, fostering circular economy principles, and diverting waste from landfills.

At facilities like Nandyal, we co-process waste materials like industrial liquid hazardous waste, plastic waste, and biomass, thereby reducing reliance on fossil fuels while efficiently managing waste.

Our commitment to innovation extends to collaborations with academic and research institutions. These partnerships have resulted in advancements such as geopolymers concrete, 3D concrete printing, and biodegradable polymers for eco-friendly packaging. We are also exploring alternative raw materials like calcined clay and developing super sulphate cement to further enhance our sustainable practices.

During FY 2022-23, slag-based products constituted 91% of our portfolio, marking a 1.1% increase from previous year. To produce these items, we have utilised 7.3 MT of waste-derived resources, encompassing slag, fly ash, artificial gypsum, and flue dust.

## 25%

Natural raw material

## ~9.7 MnT

Of total raw material consumed during FY 2022-23

## 75%

Alternative material

## ~7.3 MT

Of alternative materials consumed during FY 2022-23

## Waste management

Cement manufacturing process does not generate any process waste but other wastes from ancillary and housekeeping activities. These waste include iron scrap, plastic waste and e-waste. There are two types of hazardous wastes – waste oil and waste grease – that we generate but both are sold to authorised recyclers complying with the regulations.

**We prioritise waste reduction at the source and uphold responsible disposal practices. We undertake regular inventory assessments, and transport waste to authorised recyclers for proper recovery and disposal.**

Moreover, we actively engage in recycling and repurposing waste from various industries. This dual approach effectively reduces natural resource consumption per tonne of cement produced and minimises GHG emissions.

Throughout the year, no significant spills occurred at any of our facilities. By strictly containing wastewater within our premises, we ensure zero impact on water bodies. No wastewater was discharged into water bodies or onto land surfaces. Authorised third-party recyclers are entrusted with the proper disposal of waste materials. Complying to the latest Extended Producer Responsibility (EPR) guidelines, we have registered ourselves as plastic waste processor and as Brand owner (BO) under the Plastic Waste Management (Amendment) Rules, 2022. While we did not have the EPR liability as BO for FY 2021-22, we have co-processed around ~15,000 T of RDF or plastic waste at our Nandyal unit.

# 10x

Plastic negative by 2030.

### Smart waste management technologies

Since our inception, we have been using the cutting-edge German technology of dry process, which not only prioritises environmental sustainability but also eliminates the need for water usage.

Our plants are fully automated and are managed through a centralised control desk. To minimise air pollutants, we ensure dust-free production operations through the installation of baghouse/bag filters at transfer points. Our commitment to air quality includes employing the best baghouses for dedusting and product recovery. Storage areas are enclosed, and sealed conveyor systems facilitate product movement within the premises. Additionally, we employ water sprinkling to uphold air quality standards.

The absence of liquid waste generation throughout our manufacturing process ensures virtually non-existent water pollution in our cement plants. The cooling water tower facilitates efficient water circulation across the plant. Our approach to domestic wastewater involves treatment in a sewage treatment plant (STP), with the treated water then being used for dust suppression and nurturing green belts.

### We provide solutions to waste problems of following sectors:

- ▶ Steel
- ▶ Alumina
- ▶ Pharmaceutical
- ▶ Municipal waste
- ▶ Pulp and Paper Industry
- ▶ Textile Industry
- ▶ and many more

## Using Al-killed slag in clinker production leading to CO<sub>2</sub> reduction

Nandyal is an integrated unit of JSW Cement works. The company, built on the philosophy of the circular economy, is producing primarily the GGBS and PSC, using Blast Furnace (BF) Slag, which accounts for almost 90% of its total product portfolio.

The company has a dedicated R&D department which works aggressively towards utilisation of different types of slags in its manufacturing operations. In 2022-23, the company started to explore the possibility of adding slags to the raw ingredients for the production of clinker, without affecting its quality parameters. After conducting a few trials around raw mix optimisation, the company is currently using Al-killed Slag – another type of by-product, beside BF slag, from steel plants, at its Nandyal plant. This has led to not only a reduction of CO<sub>2</sub> emissions but also resulted in the conservation of virgin raw materials, such as limestone. In FY 2022-23, the company has used ~43000 T of Al-killed Slag partly substituting Limestone and Alumina and has avoided ~7000 T of CO<sub>2</sub> emissions.

# WATER

## Water management

**Water sustainability has been our long-term focus and we aspire to achieve a water-positive status. We aim to reduce freshwater withdrawal intensity by 15% and become 5x water-positive by 2030 through increased use of recycled and harvested water and implementing water stewardship programmes.**

Our water resource management policy aims at alleviating water scarcity in the locations where we operate. With a meticulous approach to sourcing water and embracing innovative recycling and reuse techniques, we ensure the proper treatment and disposal of wastewater, thereby mitigating its potential environmental impact. We diligently fulfil both statutory and voluntary wastewater obligations, while prohibiting the release of untreated wastewater within our premises.

Our operational units follow Zero Liquid Discharge (ZLD) technology, treating domestic wastewater through STPs for subsequent reuse. Our efforts extend to rainwater harvesting, groundwater replenishment, and the integration of water-efficient equipment. There was no significant impact of water withdrawal in our plants for this reporting year.

### Water footprint

**6,85,038 litres**

Total water consumption

**78 litres**

Water consumption per tonne of cementitious material

**62 litres**

Fresh water consumption per tonne of cementitious material

**Zero effluent discharge**

From our plants

**Almost ¼th**

Of our total water requirement was met by harvested water stored at Nandyal mines

**53,434 m<sup>3</sup>**

Of water recycled, which was primarily consumed for green belt development and dust control



Our operations span six manufacturing sites in India. Of these, three (Dolvi, Vijayanagar, and Jajpur) have access to surface water supply, while the remaining three (Shiva, Nandyal, and Salboni) rely on groundwater sources. None of our plants are situated in water-stressed regions, and we are aligned with the guidelines set forth by the Central Ground Water Authority.

We have initiated preliminary water risk assessment leveraging tools such as the India Water tool. Preliminary findings indicate that while many of our sites fall within the low-risk category, two of our plants are classified under the medium to high-risk bracket. A detailed assessment was also undertaken for Nandyal and Vijayanagar. We are currently working on water management strategy for these locations.

**5x**

Water positive by 2030

**15%**

Reduction in freshwater intensity by 2030 (vs 2020)



### Ensuring water security for our communities

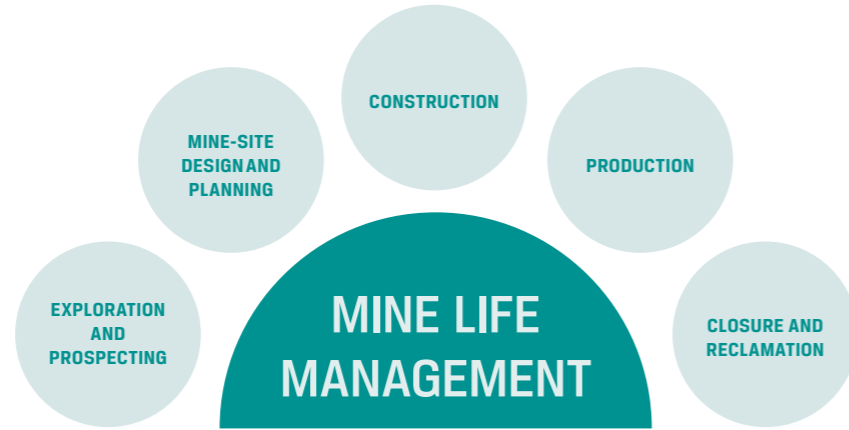
In collaboration with CII, we have conducted a comprehensive water risk assessment study at our Nandyal plant, encompassing both internal operations and external surroundings. Notably, our huge mine pits serve as reservoirs for collecting rainwater from proximate areas. This harvested water not only caters to our plant operations but also serves nearby communities, facilitating irrigation and non-potable use.

We are actively engaged in collaborating with communities to ensure water security and pre-empt potential future risks through diverse CSR initiatives.

# BIODIVERSITY

## Responsible mining and biodiversity management

We are keenly aware that resource extraction can impact biodiversity and thus ensure that we minimise our impact on nature. Together with enhancing biodiversity, we try our best to rehabilitate sites of raw material sourcing and develop the built environment in such a way that we reduce harm to the environment.



### Controlled blasting

We responsibly manage our mining operations by employing a non-electrical/shock tube-controlled blasting method, coupled with Minimate Blasters to meticulously monitor each blast. Our approach involves staged waste-dumping to optimise disposal area usage. To enhance productivity and minimise power consumption, the crusher operates at its maximum designed TPH capacity. The blasting process is aided by a meticulous drill-blasting procedure, which determines the optimal charge per hole based on stratum hardness.

### Turning unused mines into reservoirs

We are repurposing our former mines as water reservoirs to strengthen water availability for local populations. Utilising sump water from both active and decommissioned mine pits, we provide water supply to nearby communities. The reclaimed old pits serve dual purposes, being utilised for cultivation and afforestation. This approach benefits from natural groundwater inflow from the surrounding areas, consistently replenishing the sumps and former pits, ensuring a year-round water source.

To nurture the biodiversity within our mines, regular plantation initiatives are undertaken. Notably, aloe vera has been planted on the slopes of the waste dump area, supported by the construction of a garland drain and a parapet wall. Furthermore, the excavated soil is utilised for these plantation endeavours.

## Preserving biodiversity

Operating in remote regions, our operations minimally impact the local environment and biodiversity. Our comprehensive biodiversity management policy extends across all our plants, ensuring minimal disruption from our activities. Aligned with our dedication, we have pledged to achieve a 'No Net Loss' in biodiversity by 2030, reflecting our ambitious goals.

We have two active mines (Nandyal in Andhra Pradesh and Khatkurbahal in Odisha) and none of them are situated within or adjacent to nationally protected areas. However, there are a few scheduled species within 10 km of Nandyal mines, thus warranting a wildlife conservation plan. Similarly, the Vijayanagar grinding unit lies within 10 km of the Daroji Bear Sanctuary and has a dedicated wildlife conservation plan.

Moreover, our commitment extends to afforestation efforts, encompassing the annual planting of native species and diligent maintenance of green belts as per regulatory stipulations. Additionally, our operating mines adhere to approved mining and rehabilitation plans, reinforcing our steadfast commitment to sustainable practices.

We are currently undertaking impact and dependencies assessment of biodiversity and ecosystem services of our operation at all our sites including mines. Subsequently, we will be developing a strategy and biodiversity management plan and work towards implementation in order to achieve the 'No Net Loss' commitment.

## NO NET LOSS

of biodiversity by 2030

### PARTNERING CONSERVATION EFFORTS

We have joined the Indian Business and Biodiversity Initiative (IBBI), launched by the Confederation of Indian Industry (CII) in collaboration with India's Ministry of Environment, Forest and Climate Change. Additionally, we have also committed to IUCN's Leaders for Nature programme. This association aims to support businesses in amplifying innovations, new business models, and solutions that seamlessly integrate natural capital within their value creation process. This symbiotic approach benefits businesses, biodiversity, and society at large.

**2.75 LAKH**

Plantations set up across our locations till date

**~32,500**

Plantation done in FY 2022-23

