Natural capital

# Safeguarding the environment

As part of the 'hard-to-abate' sector, we are aware of the concerns over the environmental impact of many of our manufacturing processes, product use and disposal of end-of-life products. We have made circularity our starting point and made it an integral part of our operations. At the same time, we are intensifying and improving on our efforts to mitigate our Impact on climate and overall environment.




**219.7 kg**

**Per T of cementitious material**
Net $CO_2$ emissions intensity

**7.1%**

TSR

**6 million T**

Waste derived resources used

**85 litres**

**Per T of cementitious material**
Water consumption intensity

**155,030 $m^3$**

Harvested rainwater consumed

**15.2 million units**

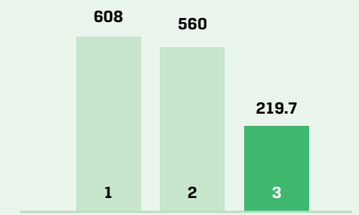
Solar energy consumed by Nandyal and Salboni plants in FY 2021-22 helped avoid 13832 T of $CO_2$

## Climate change and energy management

Cement production is an energy and material-intensive process. The primary raw material – limestone – is crushed, grounded and then heated to a temperature as high as ~1400°C in a cement kiln. The hot material is then cooled to form a clinker, an intermediate product. Subsequently, the clinker is further grounded and blended with gypsum to make Ordinary Portland Cement (OPC).

At JSW Cement, clinker is blended with other cementitious materials like slag to produce blended cement, which has a much lower carbon footprint than OPC. Currently, 89% of our total product portfolio is made using slag and fly ash. Both GGBS and PSC contain a significant amount of slag, which reduces virgin limestone consumption, lowers our clinker factor and consequently lowers emissions and specific energy.

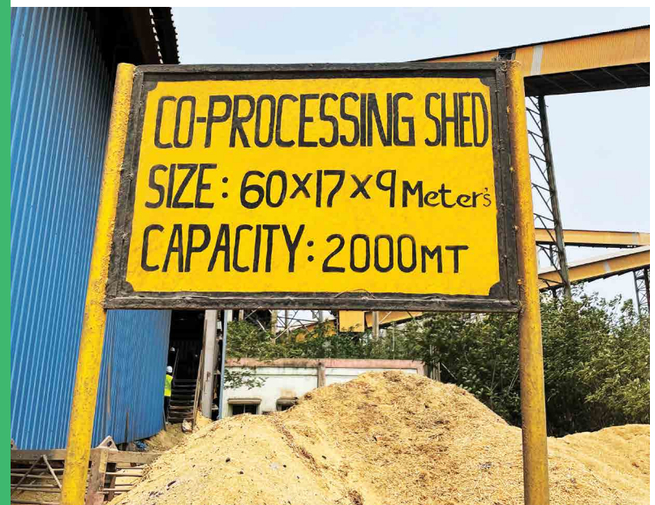
**Emissions comparison** (kg/T)




1) Global Average* 2) National Average* 3) JSW Cement

Fig: Comparison of JSWs Net Specific $CO_2$ emissions (scope 1) per tonne cementitious material with global and national average

*Global average and national average pertains to the year 2019 and is taken from Global Cement and Concrete Association




### Combatting climate change

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

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## Commitments and partnerships

To give further impetus to our sustainability journey, we have partnered and collaborated with different organisations and signed various commitments and initiatives. These partnerships represent various networking and engagement opportunities, learning platform and catalyse businesses to drive policy ambition and accelerate their efforts towards a sustainable and low carbon future.

In order to demonstrate our commitment towards net zero future and take concerted actions as a part of our decarbonisation strategy, JSW cement

- Has committed to the GCCA 2050 Cement and Concrete Industry Roadmap for Net Zero Concrete
- Became the first company in the sector to have committed to all the three campaigns of RE100, EP100 and EV100 of The Climate Group, in one go
- Has signed the UN Energy Compact which are voluntary commitments of action, with specific targets and timelines to drive the progress on the achievement of SDG7 in line with the goals of the Paris Agreement on Climate Change
- Has signed the 'Global Framework Principles for Decarbonising Heavy Industry' which provides clear steps to reduce emissions in heavy industries across the world, to both strengthen economies and help limit global warming to 1.5°C
- Became a member of UNIDO's Industrial Deep Decarbonisation Initiative's (IDDI) advisory group, in 2022
- Has signed the CII's Climate Charter and a member of CII Climate council, in 2022
- Became a member of 'Development Council for Cement Industry (DCCI)' set up by Govt. of India in 2021
- Has committed to Science Based Targets initiative (SBTi) in July'2022

Apart from above, we have also become a member of CII's India Business and Biodiversity Initiative (IBBI) and IUCN's Leader for Nature program. Both of these engagement are for enhancing our awareness and efforts towards biodiversity conservation.

### Levers being pursued for reducing $CO_2$ emissions

Latest technology and energy-efficient processes:

**Clinker Substitution**

Utilising industrial waste, such as blast furnace slag/fly ash, to substitute clinker in the production of cement or cementitious products

**Using alternate fuel**

Conserving natural resources such as coal and pet coke via co-processing of alternate fuel in clinker plant at our Nandyal and Fujairah units

**Waste heat recovery**

Reducing the consumption of coal/diesel, utilising clinker plant waste hot gases for slag drying

**Shifting towards renewable energy**

Solar plants at the Nandyal unit: **5.5 MW** and the Salboni unit: **3.5 MW**

### GHG emissions

**1,776,102 tonnes**

Absolute Scope 1 emissions (Gross)

**1,749,274 tonnes**

Absolute Scope 1 emissions (Net)

**365,930 tonnes**

Scope 2 emissions

**678,680 tonnes**

$tCO_2e$ Scope 3 emissions in FY 2021-22

Currently, almost 89% of our portfolio comprises slag-based products including Portland Slag Cement and GGBS, because of which we have the lowest average clinker factor. We are continuously reducing our average clinker factor which reduces our $CO_2$ emissions significantly. There is a marginal increase of 2% in our clinker factor in FY 2021-22, compared to the previous year.

### Reducing our carbon footprint

The primary sources of greenhouse gas emissions (GHG emissions) at our operations are cement production, raw material and finished product transportation. Our primary goal is to manufacture products with a low carbon footprint.

With an emission intensity that is 1/3rd of its global average and 36% of its national average, JSW cement has already positioned itself as a leader in its decarbonisation journey.

In 2021-22, our cementitious volume produced was 7.97 Million T. Our green cement products offer among the lowest clinker ratios in the world, which adds to our efforts of conserving natural resources and energy. As a result of our planned product mix, our specific Net $CO_2$ emissions of 219.7 Kg per T of cementitious material during FY 2021-22 were the lowest in the cement industry. We are also shifting towards renewable sources and have consumed 15.2 million units of solar power and renewable energy. We intend to gradually expand the proportion of renewable energy in our energy mix.

In 2021-22, our scope 1 net emission intensity marginally increased from 216 kg to 219.7 kg per T of cementitious material, primarily due to the inclusion of emissions from CPP at Salboni, which JSW cement acquired from JSW Energy in 2021. We maintained our scope 2 emission intensity at the same level as last year with 46 kg/T. While certain levers have contributed to $CO_2$ footprint reduction, some have also added to increased emissions.

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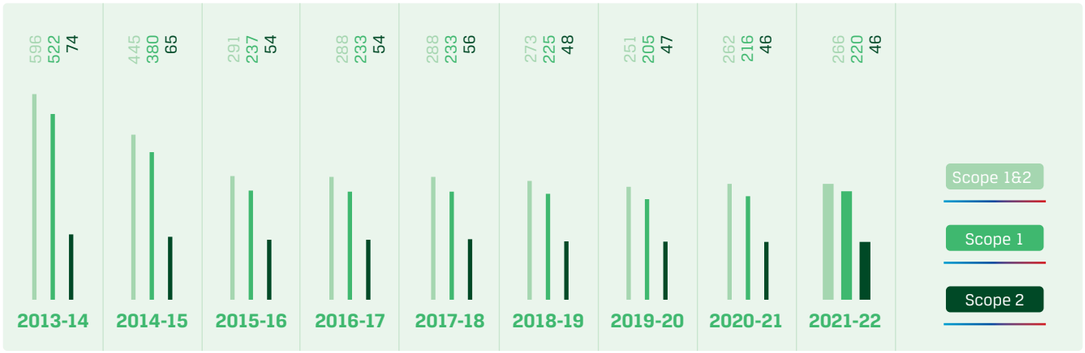
## Carbon footprint historical performance

In the past 9 years, we have reduced our carbon emission intensity by more than half.




Note: $CO_2$ emissions intensity where units is kg/T of cementitious materials

### Energy consumption

**417.3 million units**

Total electricity consumption

**15.2 million units**

Solar power consumption at Nandyal and Salboni Plants

**3.042 GJ/tonnes of clinker**

Specific thermal energy

**52.4 Kwh/T of cementitious materials**

Specific electrical energy

We source our power supply primarily from the grid and third parties. We have one captive power plant at Salboni. We are continuously increasing our use of solar power and in process of installing heat recovery across our plants to reduce our grid electricity consumption.

### Use of renewable energy at our plants

Continuing our efforts towards renewable energy consumption, we have enhanced our RE share from 3.2 % to 3.6 % in 2021-22, owing to the increased renewable power at Salboni and Nandyal. We are aiming towards further improving 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

**5,841.8 TJ**

Total thermal energy consumption at kiln

**415.7 TJ**

Energy consumption from alternative fuel

**53,723 tonnes**

$CO_2$ emissions avoided till date

**7.1%**

Thermal substitution rate

### Energy efficiency

With increased alternative fuels usage, last year, we witnessed an increase in Thermal Substitution Rate from 4.2% to 7.1 % due to increased consumption of Industrial waste, plastics/RDF waste, and biomass waste at our Nandyal plant. We use industrial waste, including pharmaceutical hazardous waste, plastic waste, carbon black and biomass waste like a ground nut and rice husk as energy sources. However, in 2021-22, our specific thermal energy has increased by 1% vis-a-vis last year.

Every year, we plan and carry out measures and implement initiatives to increase our energy efficiency. These sustainable energy solutions help us in reducing emissions and fuel cost. Some of these are:

**Energy conservation measures:**

**37,50,834 kWh/annum**

Energy savings across all five plants

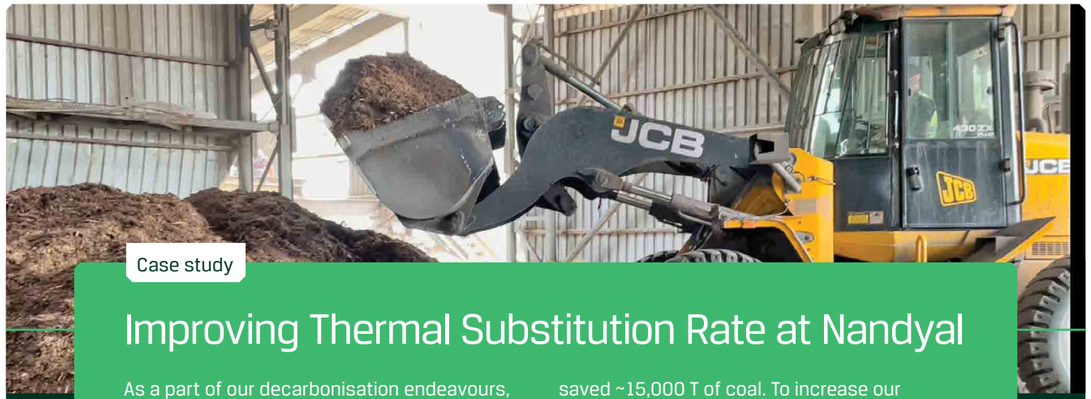
**3,413 Tonnes**

$CO_2$ emissions avoided due to multiple energy efficiency measures

**Energy conservation initiatives implemented in FY2021-22**

| Plant | Sl. No. | Title of Project |
|---|---|---|
| Nandyal | 1 | New truck loaders area lighting circuit MINI & MAX modified for power saving. |
| | 2 | Panyam Railway sliding area lighting circuit MINI & MAX modified for power saving. |
| | 3 | Installation of VFD for compressor no-5 |
| | 4 | 150KVAR X 2 capacitor bank installed in mines |
| | 5 | 6 AC units establishment of new ones in place of old ones in LC-3 |
| Salboni | 8 | Reduction of Coal consumption in RP GGBS from 15.84 kg/MT to 15.29kg/MT |
| | 9 | Reduction of Coal consumption in RP OPC from 9.98 kg/MT to 9.27 kg/MT |
| | 10 | Reduction of Oil consumption in RP GGBS from 0.34 ltrs/MT to 0.27 ltrs/MT |
| | 11 | Reduction of Oil consumption in RP OPC from 0.43 ltrs/MT to 0.38 ltrs/MT |
| | 12 | Removal of 5.5kW Airslide Motor from Circuit by Shorting Air Flow line |
| | 13 | Removal of 5.5 kW Motor From Bag Cleaning Blower |
| | 14 | Removal of 7.5 kW Belt Conveyor from 521BC5 clinker circuit after replacing it with pneumatic Gate based feed circuit |
| | 15 | Removal of 7.5 kW Belt Conveyor from 511BC4 slag circuit after replacing it with pneumatic Gate based feed circuit |
| | 16 | All metal halide flood light replaced in colony(800W 16 light replaced by 300W 8 lights for each pole)-7 nos of HM |
| | 17 | All metal halide street light replaced in colony(150W light to be replaced by 90w LED street light)-60 nos |
| | 18 | Packing Plant 22kw BF motor stopped and 55kw BF rpm increased from 850 rpm to 1250 rpm |
| Vijaynagar | 19 | Reduction of specific power consumption in RP GGBS grinding from previous 30.93 Kwh/MT to 30.23 Kwh/MT |
| | 20 | Reduction of specific power consumption in VRM OPC grinding from previous 28.23 Kwh/MT to 28.06 Kwh/MT |
| | 21 | Reduction of specific power consumption in VRM CPC grinding from previous 29.13 Kwh/MT to 27.94 Kwh/MT |
| | 22 | Reduction of specific heat consumption in VRM OPC grinding from previous 37.65 Kcal/kg to 37.24 Kcal/kg |
| | 23 | Reduction of specific heat consumption in VRM CPC grinding from previous 42.53 Kcal/kg to 41.38 Kcal/kg |
| | 24 | Reduction of specific oil consumption in RP GGBS grinding from previous 0.061 Lt/MT to 0.044 Lt/MT |
| | 25 | Reduction of specific oil consumption in VRM OPC grinding from previous 0.081 Lt/MT to 0.068 Lt/MT |
| | 26 | Reduction of specific oil consumption in VRM CPC grinding from previous 0.105 Lt/MT to 0.093 Lt/MT |
| | 27 | Admin building cassette AC indoor units kept off at open space area (5 no's) |
| | 28 | VRM bag house discharge standby air slide fan motor kept in off condition |
| Dolvi | 29 | 800 KVAR, 6.6 KV Capacitor bank installed during April 2021 in Roller Press section to improve power factor from 0.993 to 0.998 |
| | 30 | Replacement of Standard Motors with IE3 Energy efficeient Motors |
| | 31 | Replacement of Standard ductable AC units with Energy effiecient Units |
| | 32 | MSEB Consumption reduction from 3.46 % to 2.00 % of the total consumption - (Reduced Energy Charges by – Rs. 0.15 / Kwh). |
| Jajpur | 33 | LED Light Savings |
| | 34 | PF Incentives as per NESCO Tariff |
| | 35 | Air Utilisation at Process Equipment BH & BF |
| | | **Total Savings through all Projects 37,50,834 kWh** |

Note: Details of projects are given in the page 157-158



Case study

## Improving Thermal Substitution Rate at Nandyal

As a part of our decarbonisation endeavours, we have adopted waste co-processing as an essential method to reduce fuel emissions. Under the UN Energy Compact signed last year, we have set a target of reaching 30% Thermal Substitution Rate by 2030. We have made significant progress on this front at Nandyal, increasing our TSR from 4.2% in FY 2020-21 to 7.1% in FY 2021-22.

Over the last few years, we have been co-processing liquid hazardous waste from pharmaceutical industries, plastic waste and biomass waste such as rice husk. In FY 2021-22, we co-processed ~35,000 T, including ~9,000 T of biomass waste, resulting in ~70% increase in TSR, amounting to the recorded 7.1%. This has also reduced our net $CO_2$ emissions by ~40,000 T and saved ~15,000 T of coal. To increase our co-processing capability, we upgraded all our necessary installations related to AF preparation (shredder), transportation and the liquid/solid feeding system.

In a strategic move, JSW Cement has signed a Memorandum of Understanding (MoU) with Punjab Renewable Energy Systems Pvt. Ltd. (PRESPL) in March 2022, to ensure the long-term supply of biomass waste.

Apart from reducing our net emissions, it has helped us to conserve natural resources, cutting down on or overall environmental impact by reducing emissions. We are also providing an alternate source of livelihood/ income to farmers by procuring their biomass waste to meet our requirements.

## Circular Economy & Resource Conservation

Cement production is an energy and material-intensive process. The primary raw material – limestone – is crushed, grounded and then heated to a temperature as high as ~1400°C in a cement kiln. The hot material is then cooled to form a clinker, an intermediate product. Subsequently, the clinker is further grounded and blended with gypsum to make Ordinary Portland Cement (OPC).

We have adopted the circular approach right from the beginning so that we could save resources and reduce the industry's carbon footprint. At JSW Cement, clinker is blended with other cementitious materials like fly ash and slag to produce blended cement, which has a much lower carbon footprint than OPC. Currently, 89% of our total product portfolio is made using slag and fly ash. Both GGBS and PSC contain a significant amount of slag, which reduces virgin limestone consumption, lowers our clinker factor, and consequently lowers emissions and specific energy.

We have adopted the circular approach right from the beginning so that we could save resources and reduce the carbon footprint. We have been using industrial waste like slag for cement production, which reduces the clinker factor as well as carbon emissions. In plants like Nandyal, we are using waste like industrial liquid hazardous waste, plastics waste and biomass through co-processing and thus reducing our dependence on fossil fuels while managing waste efficiently.

We continue to innovate and collaborate with academic and research institutions to produce eco-friendly building materials with reduced carbon emitting process technology. Some of these collaborations have led to the development of geopolymer concrete, 3D concrete printing, biodegradable polymer for eco-friendly material packaging and so on. We are also working on the application of alternative raw materials like calcined clay and the development of super sulphate cement.

### Contributing to circular economy

We are committed to a circular economy. We were founded with the vision of recycling steel industry's waste and producing environmentally-friendly slag-based cement. With this goal in mind, we intend to utilise waste from various JSW Group industries.

### Using industrial waste to produce blended cements

We produce Portland Slag Cement (PSC) and composite cement with waste materials from other industries, such as fly ash, slag and gypsum, which are used to substitute naturally occurring limestone, thereby ensuring minimal use of natural resources.

### Alternate fuel from waste

We are using industrial waste, including pharmaceutical hazardous waste and plastic trash, as well as natural goods such as pulverised nut, rice husk, dolochar and carbon black as energy sources. This helps us in reducing emissions and minimise our natural resource usage, in addition to contributing to a circular economy and preventing waste from going to landfills.

In 2021-22, slag based products were 89%, an increase of 1% over last year. For producing such products, we have consumed 6 million T of waste-derived resources comprising slag, fly-ash, artificial gypsum, flue dust, etc.

**34%**
Natural raw material

**~9 million**
Tonnes of total raw material consumed during FY 2021-22

**66%**
Alternative material

**6 million**
Tonnes alternative materials consumed during FY 2021-22

### Best in terms of technology

**Since our inception, we have been using the cutting-edge German technology of dry process, which is environment-friendly and does not require the use of water.**
Our plants are fully automated and are managed through a centralised control desk. To reduce air pollutants, we keep our production operations dust-free and have baghouse/ bag filters installed at all transfer points. We have the best baghouses for dedusting and product recovery. All our storage spaces are covered, and closed conveyor sheets are used to move products throughout the facility. We also use water sprinkling to keep our air quality clean.

An absence of liquid generation during the manufacturing process makes water pollution essentially non-existent for our cement plants. The cooling water tower aids the circulation of water throughout the plant. Our domestic wastewater is treated in the sewage treatment plant (STP), and the treated water is further used for dust suppression and green belt development.

All of our facilities are ISO 9001:2015 (QMS), ISO 14001:2015 (EMS), ISO 45001:2018 and ISO 50001:2011 certified (EMS).

Case study

## Innovative solutions to reduce climate impact: high-performance concrete

Sustainable concrete solutions are essential to beat the climate crisis and reduce greenhouse emissions. We have developed high-grade and high-performance concrete to address these issues. Our supply of M80 concrete to one of our customer sites have achieved both strength and durability parameters successfully. We have also developed an M100 grade of concrete at our lab.

## Contributing to government projects

We are supplying PSC and GGBS mixes to various government projects across the Mumbai city.

Among the projects are L&T's Thane Creek Bridge (Mumbai Metropolitical Region Development Authority project), NCC's Mumbai Metro Project (Mumbai State Road Development Corporation project), TATA Powers transmission line over Thane Creek.

## Slag Sand (GBS Slag) – A green sand for sustainable construction practices

We need cementitious materials, aggregates, water and chemical admixtures to produce good quality concrete. Sand is a very important component in making quality concrete. However, the constant depletion of sand from riverbanks is leading to deterioration of river cores and ecosystem. The industry has come up with alternative crushed sand, but the quality of crushed sand depends on the type of rock bed and the crushing mechanism. Hence, the industry needs better and greener alternatives.

We manufacture GBS Slag sand with state-of-the-art technology. Slag sand is tailormade for the construction industry. This fits into the desired zone (Zone-II) of IS 383 and has negligible or nil silt content. Additionally, this slag sand absorbs less water so that the total water demand of the concrete mix will be less. This also accentuates the strength and durability of the concrete.



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# Ensuring environmental compliance and awareness

Compliance is critical to maintaining seamless operation of our plants. We adhere to all applicable rules for air, water and waste, both locally and nationally. We consistently monitor parameters across all these to ensure they are well within the permitted range. There was no non-compliance with environmental laws and regulations at any of our plants during FY 2021-22 . There were some show cause notices but those have been addressed accordingly. We have also stopped the usage the single-use plastics.

To raise environmental awareness, we commemorate World Environment Day, World Water Day, Van Mahotsav and World Earth Day, across our factories with all employees, including contractual staff and their families. Green belts are being developed around our plants and mines through massive plantation campaigns.

# Ecosystem restoration

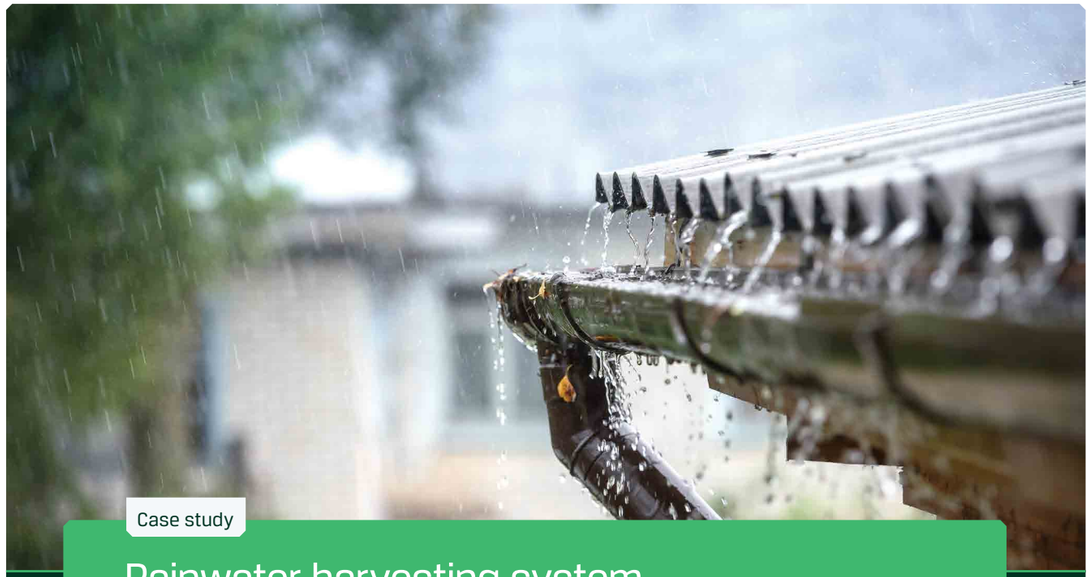
### Water management

Our water resource management policy aims at reducing water scarcity in the locations where we operate. We source water carefully and use innovative methods for recycling and reuse, ensuring effective treatment of wastewater and its appropriate disposal that limits its possible impact on the environment. We are committed to meeting our statutory and voluntary wastewater obligations and prohibit discharging untreated wastewater in our properties.

We use Zero Liquid Discharge (ZLD) technology at our units and treat domestic wastewater treated at sewage treatment plant for reuse. Apart from this we ensure rainwater harvesting, groundwater recharge and the use of water-efficient equipment.

We have taken a target for year 2030 of becoming water positive by at least 5 times. Also we are working towards reducing our freshwater consumption Intensity by more than 15% (vs 2021)

NATURAL CAPITAL



Case study

## Rainwater harvesting system

We have installed a rainwater harvesting system at our Dolvi unit to collect rainwater from the rooftop and store it in a tank for internal usage. We have utilised the rooftop of the admin building which has the capacity to harvest ~3216.03 m3 water annually.

**How it works**

- The rooftop/terrace water gets diverted through NP2/PVC pipes to the rainwater harvesting unit, which then passes through the valve chamber to reach the collection tank.
- The water is filtered through the Johnson 'V' wire screens installed at the entrance of the collection tank.

**Size of rainwater harvesting unit:**

- Collection tank: 5.0 Mtr. x 4.5 Mtr. x 4. 0Mtr.Depth
- First flush chamber: 0.9 Mtr. x 0.6 Mtr. x 1.0 Mtr. Depth
- Existing filtration chamber: 1.5Mtr. x 0.9 Mtr. x 2.2 Mtr.Depth
- Filter screen (SS304): 16" x 23" dia of 0.5 Mtr. Length.

**Expenses incurred on RWHS:**

- Consultancy service for Rainwater Harvesting- ₹71,500.00
- Cost of wire filter for Rainwater Harvesting – ₹55,000.00

**Plot details and run off calculations:**

| Sr. No. | Description | Units |
|---|---|---|
| 1 | Admin building terrace area | 1354.12 Sq. Mt |
| 2 | Volume of water harvested considering 31mm rainfall/day for the monsoon period. | 39.87 Cu. Mt. |
| 3 | Volume of water annually harvested considering rainfall. | 3216.03 Cu. Mt. |

### Highlights of water management in FY 2021-22

- No significant impact of water withdrawal in our plants
- No effluent discharge from our plants during the reporting year
- Last year almost 1/4th of our total water requirement was met by harvested water, stored at Nandyal mines. Last year we have recycled 52,488 $m^3$ of water which was primarily consumed for green belt development and dust control.

**6,73,539 $m^3$**

Total water consumption

**85 litres**

Water consumption per tonne of cementitious material

**65 litres**

Fresh water consumption per tonne of cementitious material

We have six manufacturing locations in India out of which three sites having surface water supply (at Dolvi, Vijaynagar and Jajpur) and three sites (Shiva, Nandyal and Salboni) are withdrawing water from ground. None of our plants are located in water-stressed areas, according to the Central Ground Water Authority guidelines. Through CII, we have carried out water risk study at Nandyal plant and the assessment covers both operations as well as outside the boundary. We have a huge mine pits which serve as reservoirs for harvesting rainwater from nearby areas. This harvested water is used for plant operations as well as supplied to nearby communities for irrigation and non-potable use.

We are also working with communities for ensuring the water security or to avoid any future risk through various CSR interventions. The company is also planning to completely phase out groundwater extraction by 2024-25 and will only utilise the harvested rain water collected in mine pit.

## Responsible mining and biodiversity management

### Our 5-stage system of mine life management

**Exploration and prospecting**

**Mine-site design and planning**

**Construction**

**Production**

**Closure and reclamation**

### Controlled blasting

We responsibly handle our mining operations, using non-electrical/shock tube-controlled blasting approach and minimate blaster to monitor each blast. To make the best use of the disposal area, stage waste-dumping is practised. To maximise productivity and reduce power consumption, the crusher operates with a maximum designed TPH. The blasting process is aided by a proper drill-blasting and optimum charge per hole based on stratum hardness.

### Turning unused mines into reservoirs

We are using our old mined as water reservoirs to make more water available to local populations. Sump water from the active mine pit or old mine pits are used to supply water to local communities. Old pits are also used for cultivation and plantation. Groundwater pours in from the surrounding areas, replenishing the sumps and the old pits. As a result, there is enough water available throughout year. We conduct plantation drives on a regular basis to sustain the biodiversity in our mines. We have planted aloe vera in the garbage dump slope area and built a garland drain and a parapet wall around it. The excavated soil is used for plantations.

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## Biodiversity management

We work in remote locations and sometimes our activities have an impact on the local environment and biodiversity. Hence, we make consistent efforts to preserve the biodiversity and ecosystem of our area of operations. Our biodiversity management policy is implemented across our plants through which we ensure that our activities cause minimum disturbance. We have committed to having a 'No Net Loss' on biodiversity by 2030.

We have two active mines (Nandyal in Andhra Pradesh and Khatkurbahal in Odisha) and none of them are within or adjacent to any nationally protected areas. Nandyal has a few scheduled one species within 10km and thus, has a wildlife conservation plan. Similarly, Vijaynagar grinding unit has Daroji Bear Sanctuary within 10 km and has a wildlife conservation plan. Apart from this, we are planting native species each year and maintaining the green belt as per the regulatory requirements. We also have approved mining and rehabilitation plan at our operating mines.

Recently, we have become a member of the Indian Business and Biodiversity Initiative (IBBI), an initiative by the Confederation of Indian Industry (CII) in partnership with India's Ministry of Environment, Forest & Climate Change. We have also signed for IUCN's Leaders for Nature Program to help businesses to scale up innovations, new business models and solutions in integrating natural capital in the value they create, mutually benefitting business, biodiversity and society.

**2.75 lakh**

plantation done across our locations till date

Case study

### Miyawaki forest implementation at Vijayanagar

This afforestation method is based on the work of Japanese botanist Akira Miyawaki. The technique compresses layers of a forest – shrubs, trees, canopies – on small plots of land, turning them into tiny forests.

The growth of Miyawaki forests in and around our plant areas help increase the green cover. They help lower temperatures in concrete heat islands, reduce air and noise pollution, attract local birds and insects and create carbon sinks. These forests also help in reversing declining tree cover, provide a better environment and help us improve air quality.

**28 varieties**

Of local species used

**270 plants**

No. of plants used in 90 sq m area (average 3 per sq m)

**30% tall and evergreen, 30% shrubs, 40% medium plants**

## Air emissions

We recognise our responsibility to preserve the air quality. Emissions from our commercial operations include dust, nitrogen oxide (NOx), and sulphur oxides (SOx).

The primary sources of our dust emissions are cement production stacks, as well as fugitive emissions from quarrying, material transfer, loading/unloading and open storage of materials at a few manufacturing sites. The combustion of fuel and raw materials produces SOx and NOx emissions.

We have installed systems for continuous monitoring of emissions and ambient air quality at our plants and we map our stack and fugitive emissions of dust (PM10, PM2.5), SO2 and NOx. We continue to comply with all applicable local and national regulations on emissions. We are constantly improving our performance and management standards on air quality management. We do not emit any ozone depleting substances (ODS) during the cement making process. Our other auxiliary emissions are almost non-existent. We record kiln stack emissions. We only have one kiln at Nandyal, from which we report 100% emissions.

## Waste management

We focus on minimising waste at the source itself and disposing it of responsibly. Our inventory is mapped regularly and our waste is transported to authorised recyclers for recovery and disposal.

We also recycle and use waste from other industries. This decreases both the quantity of natural resources needed per tonne of cement produced and GHG emissions.

During the year, there were no significant spills at any of our plants. As we ensure no wastewater is discharged outside of our facilities, our operations have no influence on water bodies. We did not discharge any wastewater into water bodies or onto land surface. Furthermore, the waste is supplied to authorised third-party recyclers for proper disposal.

Note: All environment indicators performance are given in Performance table on page no 135

### Energy bin implementation at Vijayanagar

It is common practice to dump organic waste in landfills. But organic materials cause severe environmental problems through methane emissions during degradation. Methane is considered more harmful than carbon dioxide. Moreover, disposed organic waste is the prime source of diseases and contamination of air and water.

Normally aerobic decay of organic waste leads to the emission of greenhouse gases like carbon dioxide or carbon monoxide. The process of methanation reduces GHG emissions and helps in arresting the depletion of the ozone layer. This is likely to earn carbon credits.

Conversion of organic waste into methane and its use as gas will lead to energy security because fossil fuel is not going to last forever.

**2,08,503 m3**

Biogas generated and utilised in the canteen