

# Environment

## Sustainable Environmental Outcomes



At Hindustan Zinc, we understand the fundamental importance of managing our impact on the environment, as our core business inherently relies on natural resources. We seek to operate responsibly to prevent pollution and minimize our environmental footprint across operations. We focus on minimizing and mitigating our impact on water, land, air quality, climate and biodiversity, and remain committed to engage with stakeholders in harmony to reduce environmental footprint of our operation by deploying resource management systems and controls.



**WATER STEWARDSHIP**



**TAILINGS DAMS  
MANAGEMENT**



**ENERGY MANAGEMENT**



**CLIMATE CHANGE**



**WASTE MANAGEMENT**



**MAINTAINING AIR  
QUALITY**



**BIODIVERSITY  
MANAGEMENT**



## Water Stewardship

Water stewardship is one of the most critical elements of our sustainability framework and a mainstay of our environment conservation strategy. Reducing the amount of fresh water intake we use in our operations, and protecting water quality, reduces our environmental footprint and helps us to maintain community and stakeholder support. We are demonstrating our commitment for water stewardship by using water prudently, maintaining water quality, and engaging with communities to collaboratively manage a shared water resource throughout the mining life cycle.

### Long-Term Commitment Towards Water Stewardship

To support development of sustainable resources, we are focused on two areas: improving water efficiency and working with others to enhance the benefits and availability of water resources. We have taken the long-term target **to be 5 Times Water Positive Company and achieve 25% reduction in fresh water consumption by 2025 from base year 2020.**

Our water stewardship targets are focused on completing actions that align with Sustainable Development Goal 6 which is about **“Clean water and sanitation for all”**. We are also committed for **UN Global Compact Water Action Platform (CEO Water Mandate)**, a commitment to adopt and implement the mandate’s strategic framework and its six core elements for water management.

### Our Strategy

Our operations exist in areas of varying degrees of water stress and hence requires localized strategy. Consequently, we take our water consumption and management extremely seriously. Through our water management policy, we have committed to recognize the social, economic and environmental value of water taking note of the global concern of water scarcity.



### 2.41 Times Water Positive Company

As one of the leaders in the Mining industry, Hindustan Zinc was declared Water Positive Company based on assurance carried out by a third-party organization. With this ratio of 2.41, Hindustan Zinc is certified among the top water conserving companies.

Operating in a water scarce state like Rajasthan, the significance of water is all the more underlined. Being the economic engine for Rajasthan, Hindustan Zinc puts a lot of emphasis on conserving water, with strategies focusing on reduction of water at source, recycling of water, exploring alternative sources of water and replenishing water through various structures. Hindustan Zinc has put persistent efforts into water sustainability. The Company has state-of-the-art effluent treatment plants & recycling facilities, sewage treatment plant, increased water efficiency and rainwater harvesting structures; advancements in which have significantly contributed to this water stewardship drive.

We strive to minimize the amount of fresh water we consume by reusing as much water as possible in our operations. We have adopted a multi-pronged approach to manage water resources:

- |   |                          |   |
|---|--------------------------|---|
| 1 Minimizing the Use of Water in Operations | 3 Exploring Alternatives | 5 Developing Rainwater Harvesting Systems to Replenish Ground Water Sources |
| 2 Increasing the Use of Recycled Water      | 4 Monitoring & Auditing  |   |

## Hindustan Zinc Sets up India's First Dry-Tailing Plant

Water conservation is a collective responsibility and a non-negotiable aspect for sustainable development. Conserving water should not just be taken as 'need of the hour' but as an ingrained approach towards the environment. As one of the leaders in the mining industry, Hindustan Zinc has taken several efforts to save, conserve and manage water, while also being environment-friendly and sustainable in its operations. One of the best examples of this, is the Company's Dry Tailing technology. Hindustan Zinc has setup India's first Dry Tailing Plant at their Zawar Mines in Rajasthan.

The Dry Tailing technology is based on separating water from tailings slurry, which is generated in the beneficiation process. Tailings are a mixture of powdered rock and water that is left over after the minerals and metals are extracted from the ore, which needs to be managed in a sustainable manner. Hindustan Zinc repurposes tailings materials and waste rock as backfill to stabilize our underground mining operations,



while the remaining tailings are then placed in a specially designed tailings storage to minimize the environmental, social, and economic risks.

The Dry Tailing system is a one-of-its-kind technology that involves processing of tailings in the most sustainable method. In addition to its small footprint, **key benefits of the dry tailing technology include recirculation of more than 80% of the process water present in tailings**, a faster rehabilitation and restoration of storage site at mine closure and ensuring re-availability of water for further use. This makes the system a highly efficient technology to treat tailings while also conserving water.

## Expansion of Udaipur STP from 45 to 60 MLD

We commissioned a 20 MLD STP in Udaipur in 2014 under a public-private partnership, which is the first of its kind in Rajasthan. Further, Hindustan Zinc and Udaipur Smart City Limited signed an agreement in June 2017 to extend the sewage treatment capacity by another 40 MLD. Of the proposed 40 MLD STP, 25 MLD has been commissioned in January 2019. Another 15 MLD commissioned in FY 2020-21 taking the total to 60 MLD.

### Impact

Sewage water is treated through various steps that include biological processes, wherein the product consists of treated water and manure. These are then used in sludge thickening and dewatering units and treated water is being sent to our operations. Power consumption has also reduced on account of the fully automatic plant and hydraulics mechanism. The process of treatment is environment-friendly as well, since no hazardous emissions are generated during the process.

**The replacement of fresh water for operations by STP treated water has led to increased availability of fresh water for the community.**



### Water Performance for FY2021

#### Sp. Water Consumption m3 per ton of metal

2020-21	13.92
2019-20	14.51
2018-19	15.73

#### % of Water Recycled

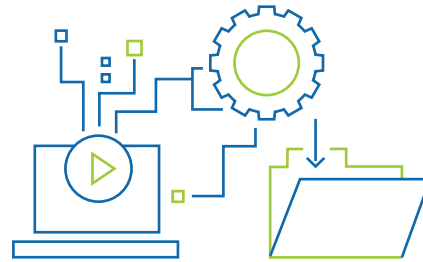
2020-21	40
2019-20	39
2018-19	36



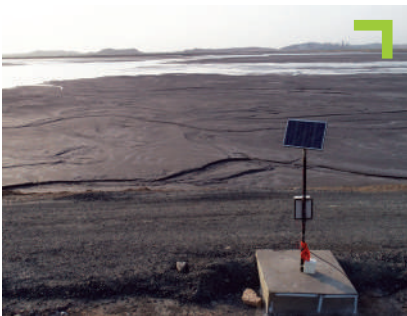


## TAILINGS DAM MANAGEMENT

Hindustan Zinc has implemented global leading practice in tailings dam management and has appointed a global expert to provide long-term monitoring and advice on the design, construction and operation of our three tailing storage facilities. Overall, good construction quality and upgradation of tailings slurry transport and discharge lines with installation of piezometers (and one inclinometer) with automated data collection and web-based monitoring make it world-class.



### 3 Existing Tailings Dams (RDM, RM, ZM)



**Inclinometer**



**Dry Tailing Plant**



**Paste Fill Plant**

#### Governance

- Tailing Management Policy
- Vedanta Tailings Dam Management Standard
- Tailings Storage Facility (TSF) committee comprises of experts from various functions

#### Audit / Review

##### Internal

- Comprehensive Internal audits / inspection by cross-functional teams
- Hazard identification & risk assessment carried out and reviewed periodically

##### External

- Engagement of world-class consultants from Indian Institute of Science (IISc), Bengaluru
- Independent assessment by global experts to review the integrity / stability of our dam structures and their associated management practices

#### Geotech Monitoring on Tailings Dam

- Pillar-prism-total station data: Slope displacement
- Piezometer data: pore water pressure
- Inclinometer data: sub-surface deformation

#### Process Optimization

- Tailings utilization in back filling through Paste fill/ Hydro fill
- Replacement of wet tailing disposal system with dry tailing disposal
- Supernatant water is collected and recycled in process
- Using deep cone decanter to reduce water content in mine tailing disposal
- Garland Drains around Tailings Dam, Zero Liquid Discharge is maintained from tailings dam

## Digitalization-Satellite Monitoring of Tailings Dams, Open Pit and Waste Dumps



Safe and responsible management of tailing storage facilities is an integral part of mining at Hindustan Zinc. We recognize the potential impact of these facilities on the environment, nearby communities and other stakeholders. During construction, operation, maintenance and closure of the tailings facilities, we are taking extensive measures to mitigate the risk of tailings dam failures and incorporate the best available technology to minimize the environmental impact.

Continuous operational and stability monitoring plays a major role in ensuring the safety of tailings dam storage facilities. It involves:

- 1 Regular physical inspections of the structural integrity of the dams, tailings placement compliance with plan and environmental impact.
- 2 Regular instrumental monitoring:
  - Geodetic surveys of pillar-prisms placed on the tailings dams to measure surface displacements
  - Measurements of pore water pressure within the dam using piezometers

- Measurements of sub-surface deformations within the dam using inclinometers

The monitoring involves both qualitative and quantitative analysis of actual vs. expected performance. Regular reviews of monitoring information provide an early indication of performance trends that, although within specification, may warrant further evaluation or risk mitigation actions.

**In 2021 Hindustan Zinc has introduced a novel, satellite based InSAR (Interferometric Synthetic Aperture Radar) monitoring technique to provide early warning of surface ground movements.** This technique allows mapping deformation using radar images of the ground surface that are collected from orbiting satellites. It enables high precision surface displacement monitoring at a mine scale. InSAR monitoring is carried out at 13 sites, including Rampura Agucha open pit, all tailings dams and selected waste dumps. InSAR monitoring augments existing stability monitoring systems and provides greater safety and management assurance.



## ENERGY MANAGEMENT

The Mine and Metal industry is energy-intensive. As a leading player in the sector, we are investing in latest technologies and processes, that are recognized as industry benchmarks, to enhance energy efficiencies.

With a commitment to efficient usage of energy and diversifying our energy portfolio to the extent possible, we are reducing overall energy consumption, improving energy efficiency and using green energy to help mitigate climate change.

### Energy Performance in FY2021

Total Energy Saved - 3,48,953 GJ

#### Sp. Energy Consumption GJ per ton of metal

2020-21	19.96
2019-20	20.39
2018-19	20.47

### Turbine Revamping

Hindustan Zinc has six units of Captive Power Plant across different locations. Due to continuous increase in load demand on account of ongoing expansions and commitment to reduce CO<sub>2</sub> emissions, we have started looking for innovative ways to generate power.

We have decided to move forward with turbine revamping after a detailed study and discussion with OEM as well as various turbine manufacturers.

This project is registered under VERRA (the world's most widely used voluntary GHG program) as a carbon reduction project. Further, turbine revamping of all Hindustan Zinc captive thermal power plants will help in reduction of 2,70,000 tCO<sub>2</sub>e per annum equivalent to 5.6% of annual emission of Hindustan Zinc.



## CLIMATE CHANGE

Reinforcing its commitment to sustainable operations, Hindustan Zinc is supporting the objective of Paris Agreement and encourage that the ambition set out by the Paris Agreement is met or exceeded to limit global temperature rise to well below 2, preferably to 1.5 degrees Celsius, compared to pre-industrial levels. We also realize that taking strong action to reduce emissions can not only reduce the risks of climate change but also deliver better growth and sustainable development, to implement this realization into action, **we are working towards achieving Science-Based Targets (SBT's) to reduce carbon footprint by 14% by FY2027.**

Meeting science-based targets in the context of a growing business can be difficult. Responding to this challenge, Hindustan Zinc has implemented a range of measures to reduce its Scope 1 and 2 emissions throughout its life cycle. The Company dedicates its investments on efficient use of energy and also work on gainful utilization of wastes using environment-friendly methods. Hindustan Zinc has a green power capacity of around 349.19 MW, which includes 273.5 MW of wind power (non-captive), 40.42 MW (captive) solar power and 35.27 MW of waste heat power. All our Wind and Solar Projects has been also registered under Gold Standard (GS), which is the most rigorous certification standard globally for carbon offset projects. The Gold Standard is an independent certification standard for carbon credits generated from CDM or VER projects.

Our captive thermal, solar and waste heat recycling power plants provide low-cost and reliable power to our operations. With our commitment towards climate change, we have increased solar power capacity by 2.5 times in the last two years and plan to add more in the near future.

We are pioneer in adopting innovative solutions and smart technologies for responsible mining, **Hindustan Zinc sets a new benchmark as the company leads the way for introduction of Battery Electric Vehicles (BEVs) in underground mining.**

Taking a step closer to achieving carbon neutrality, Hindustan Zinc signed a Memorandum of Understanding with Epiroc for 'Zero Emission and Sustainable Mining by introduction of Battery Electric Vehicle (BEV) in underground mining'. This will help Hindustan Zinc to explore the possibility of introducing battery-operated vehicles in underground mines which will help reduce carbon emissions, enabling the mine operations to become more environment-friendly. **Our inclusion in the CDP 'A List' is a recognition of Hindustan Zinc's commitment and continuous efforts towards climate adaptation and resilience.** We also support reporting via Task Force on Climate-Related Financial Disclosures (TCFD) guidelines. Our TCFD report will detail Hindustan Zinc's governance, strategy and portfolio resilience to a range of climate scenarios.

Partnering as COP26 Business Leaders and Confederation of Indian Industry (CII) Working Group on Driving Accelerated Climate Action, we are firm to work with the trade associations for setting new set of guidelines for effective transition to a low-emissions and climate-resilient future and raising awareness among the large- and small-scale business on the campaigns like Race to Zero and Race to Resilience. The need of the hour is to reaffirm our commitment towards stepping up to the urgent challenge of climate change and help create a sustainable, low-carbon future for all.

During the year, the Company produced solar power of 83.43 mn units, waste heat energy of 203.13 mn units and wind power of 362.93 mn units leading to avoid 5,51,695 ton of CO<sub>2</sub> through green power.



## CARBON FOOTPRINT REDUCTION

The Company is planning to reduce its carbon footprint through following projects leading to avoidance of 5,00,000 ton of CO<sub>2</sub>:

- Commissioning of 35.27 MW Waste Heat Recovery Boiler (WHRB) at Fumer project
- Installation of 5.58 MW WHRB at Dariba
- Sifting of Mines Material from underground to surface by Winder in place of heavy machinery.
- Installation of variable frequency drives to reduce auxiliary power consumption
- Revamping of Turbines of CPP
- Use of Electrical HEMM Vehicles in Underground mines in place of HSD based HEMM



## MAINTAINING AIR QUALITY

Hindustan Zinc is committed to measuring, controlling and reducing air emissions at each of our sites and is implementing systems & procedures to address the concerns of local communities as well as to comply with the environmental license conditions. Through advanced mitigation, measurement and management strategies, it continues to identify, reduce and wherever possible, eliminate any potential impacts to air quality caused by improving operational processes and increasing awareness. The Company has installed online effluent and emission monitoring systems connected directly to the servers of Pollution Control Board.





### MoU with Epiroc (Sweden)

#### Hindustan Zinc Leads the Way for Reducing Carbon Emission in Underground Mining

- Hindustan Zinc & Epiroc Rock Drills AB (Sweden) sign an MoU for Zero Emission and Sustainable Mining by introduction of Battery Electric Vehicle (BEV) in underground mining
- Hindustan Zinc will become the first mining company in India to introduce electric vehicles in UG mines



## BIODIVERSITY MANAGEMENT

Protecting and enhancing biodiversity is an integral part of Hindustan Zinc's commitment to sustainable development. We have developed a unique and exclusive BMP for all our operations. Our dedicated Biodiversity Policy and Management Standard advises on how disruption to flora and fauna should be avoided, minimized or compensated for, from project scoping to site closure and beyond. Our aim is to achieve a minimum of No Net Loss (NNL) of biodiversity and Net Positive Gain (NPG) of biodiversity (in case any critical habitat is present) at all our operations. Massive afforestation program, Peacock Conservation Park, endangered plant nursery, butterfly garden, medicinal park, tree inventorization, plantation on Kalimagri and Ratnagiri are few of the key projects undertaken for biodiversity management.



### Biodiversity Park Development at Rajpura Dariba Mine

Under the Biodiversity Park project, around 10 ha of land in Rajpura Dariba Complex has been developed where around 50,000 plants of 42 different species were planted to attract local and migratory birds which come to a nearby irrigation pond.



### Jarofix Yard Restoration at Chanderiya Lead Zinc Smelter

In collaboration with TERI (The Energy and research Institute) CLZS team has used mycorrhiza technology for the restoration of exhausted Jarofix Yard. The technology is a symbiotic association between a plant and a fungus, where the plant provides food for the fungus and the fungus draws nutrients from the soil and add to improvement of cultivation processes, rejuvenation of fertile soils and reclamation of wasteland into productive land in a sustainable manner.