Risk Management

Mitigating risks and harnessing opportunities to drive sustainable growth

At Hindustan Zinc, proactive risk management is key to sustainable and responsible growth. Our ISO 31000 certified risk management framework and governance mechanism integrates best-in-class practices and tools to identify, assess and mitigate the potential risks and their impacts. We promote a risk-aware culture and take a proactive stance on ESG and emerging risks to effectively navigate challenges and seize opportunities for continued success.

To further strengthen our risk management, we have engaged Deloitte as our service partner to provide expertise and guidance in navigating the complex risk landscape within our organisation, helping us maintain the highest standards of governance and resilience in the face of evolving challenges.

RISK MANAGEMENT STRATEGY

Board Oversight

The Audit and Risk Management (ARM) Committee of the Board oversees the implementation of the Enterprise Risk Management (ERM) framework in compliance with the requirements of the Companies Act, 2013 and SEBI (LODR)

Global Risk Management Standards

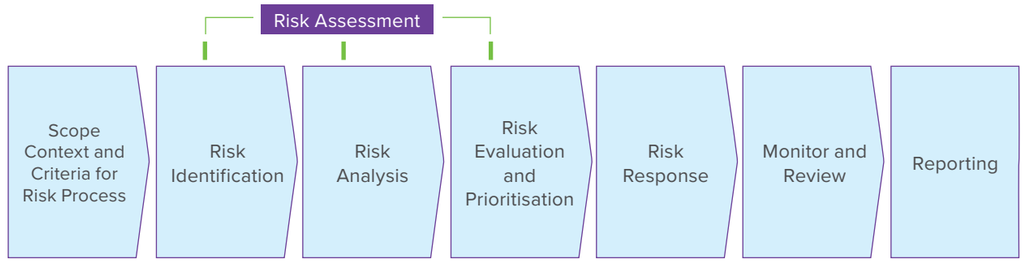
Our ERM framework is in accordance with leading standards and guidelines, including ISO 31000, Committee of Sponsoring Organisations (COSO) framework and other statutory regulations in India

Integrated Risk Approach

A comprehensive risk management programme integrates enterprise risk and risk appraisal for capital expenditure, besides mergers and acquisitions, project risks and crisis management, across our business functions

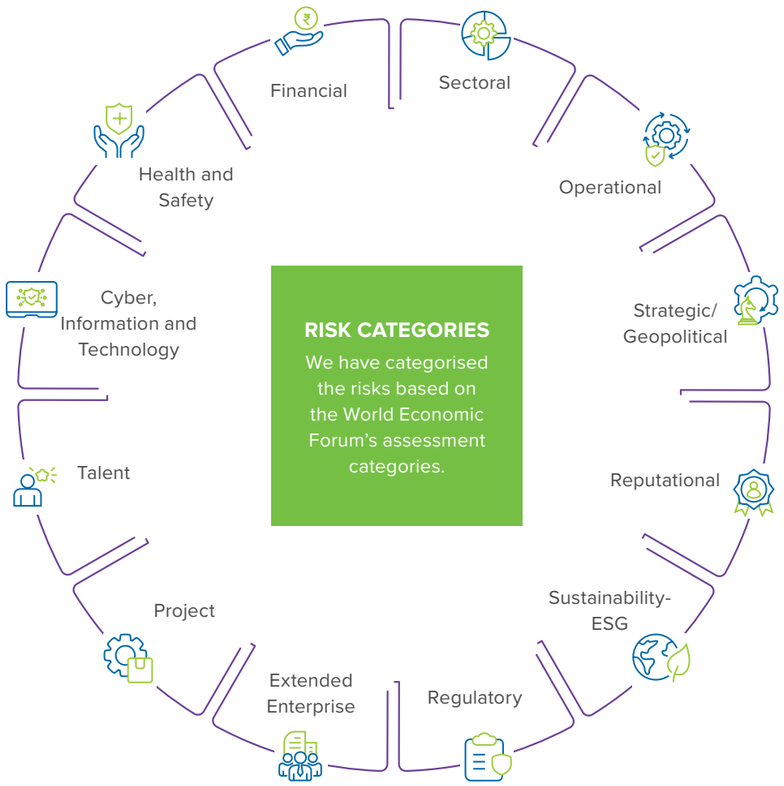
RISK MANAGEMENT FRAMEWORK

Our structured risk management framework facilitates effective identification, discussion, measurement and management of vital opportunities and risks across all our business units and corporate functions.



RISK APPETITE AND TOLERANCE

The Board has clearly defined our risk appetite, outlining the acceptable risks the Company is willing to accept to achieve its business strategy. The Board has also specified the tolerance limits to objectively evaluate our risk-taking ability, facilitating the assessment and measurement of the identified risks. Risk tolerance puts risk appetite into practice, using quantitative metrics. We assess risk impact on a 5-point scale, with any impact exceeding 10% on projected EBITDA (breach of risk tolerance) assigned a maximum risk impact score of 'Very High' or '5'.



RISK ASSESSMENT

The existing and emerging risks and opportunities are classified into different categories. These risks are subsequently prioritised based on the frequency of their occurrence or recurrence, the degree of their potential impact on revenue and cost, and the ability to disrupt our primary operations.

Risk assessment at Hindustan Zinc is a comprehensive exercise, involving:

Risk Identification

- Identify and list plausible uncertainties or risks with the potential to impact our functional, organisational and business objectives, or disrupt business continuity
- Identify emerging risks with a limited current response plan due to their nature, but may become a part of the risk register in future
- Multiple-stakeholder approach for effective risk identification, encouraging employee participation for early detection of emerging risks
- Engage with key stakeholders, such as customers and suppliers, to gain insights into key risks they face, for broader risk identification
- Use our understanding of regulatory and legal requirements to anticipate potential risks and events that typically precede their emergence

Identify functional, unit and enterprise-wide risks → Identify stakeholders to be involved in the risk management process → Record risk and bucket into applicable risk categories → Risk reporting

Identifying Emerging Risks

Recognising that emerging risks can invalidate critical assumptions in strategic planning, we maintain a keen vigilance in their identification and evaluation to maintain relevance.

- We have initiated global risk sensing to determine relevant emerging risks
- Employees are encouraged to submit potential risks for review to the unit risk officers or the Chief Risk Officer (CRO)
- Employees are necessitated to stay updated on industry trends through leading publications, participation in sector-specific events, and continuous engagement with the senior management

RISK ANALYSIS, EVALUATION AND PRIORITISATION

- Understand risk attributes, including the causes, likelihood of occurrence, potential positive or negative impact, and velocity or the time taken for impact since their occurrence
- Prioritise the risks by assigning a risk score and rating based on the impact, likelihood and velocity on a 5-point scale, aiding in the deployment of appropriate response strategies

CONTINUOUS MONITORING AND REVIEW

Acknowledging the evolving nature of risks and their attributes, we continuously review and track the external environment and internal controls vis-à-vis our business strategy. Quarterly risk reviews ensure agility and prompt timely actions and necessary controls for risk mitigation. We also review the Company's risk exposure annually.

Risk Monitoring and Review Measures

- Quarterly reviews at ManCom level and biannually at Board level to monitor risk exposure
- All risk owners are responsible for tracking assigned key risk indicator (KRI) metrics, either manually or through SAP-based series of "warning lights"
- All risk owners escalate KRI breaches to the unit/ corporate risk officer, especially the ones in the 'red-high level' category
- Risk owners communicate response plans with implementation status to the unit/corporate risk officer, jointly with the response owner, along with plans for developing new response strategies based on periodic reassessment of risks and effectiveness of mitigations
- Risk owners review principal risks at least quarterly, with biannual and annual review of moderate and acceptable risks
- Moderate and acceptable risks exceeding KRI thresholds are reassessed and reviewed by risk owners for severity as per the severity matrix
- Implemented the SAP governance, risk and compliance (GRC) risk management module for automated KRI monitoring, workflow-based risk submission, assessment and mitigation planning, escalations and reporting mechanisms to enhance the risk management process
- Stress testing and sensitivity analysis conducted using scenario modelling and simulations through a 'what-if' analysis and techniques like Monte Carlo simulation, to predict a range of possibilities and outcomes for an uncertain event

During FY2025, an external surveillance audit was conducted, validating and reaffirming our ISO 31000:2018 certification. We also conducted an internal audit during the year to ensure the efficacy of our risk management process.

STRONG RISK GOVERNANCE

Our Three-tiered Defence Model and Risk Governance Structure

Provides robust oversight, risk infrastructure and management, and ownership

Integrates the ERM process with management decision-making

Enables quarterly risk tracking, monitoring, and review

Assigns clear roles and responsibilities at each level

Governance Structure with Defined Roles and Responsibilities

Governance and Oversight

Board of Directors (BOD)

- Responsible for oversight of risk management across the organisation
- Approves policies addressing high-risk areas

Audit and Risk Management (ARM) Committee

- Highest Board-level Committee, comprising three Independent/Executive Directors with experience in risk management
- Apprises the Board annually on organisation-wide risk management
- Reviews risk management practices on a half-yearly basis

Risk Infrastructure and Management

Chief Executive Officer (CEO)

- Chairs the Management Committee (ManCom) that includes risk management matters in its agenda and ensures timely and adequate mitigation
- Presents risk reviews before the ARM Committee
- ManCom reviews the Company's risk exposure and the impact of global events every quarter

Chief Risk Officer (CRO)

- Reports to the CEO as an overall custodian of the risk management process
- Reports to the ARM Committee about existing and emerging risks
- Supports management in determining risk appetite, identifying trends and emerging risks
- Leads risk team and guides unit/ corporate risk officers
- Monitors and coordinates risk management, oversees activities at the operational level, facilitating effective governance
- Continuously monitors enterprise-level principal residual risks, reviews cost, adequacy, effectiveness of the response plans, and accuracy and completeness of reporting

Risk Ownership

Unit/Corporate Risk Officers

- Dedicated risk officer at each unit to identify and monitor risk at the location level
- Convenes unit risk councils every quarter to review risks and response plans
- Reports unit-level risks to the CRO
- Single point of contact for employees to report risks

Risk Management Process Audit

The head of internal audit is responsible for auditing the risk management performance and providing an independent assurance of its compliance with the Company's risk strategies and policies. A report detailing the findings of independent audits is submitted to the ARM committee and the Head of Management Assurance System at the corporate level.

PROACTIVE RISK CULTURE

All business functions at Hindustan Zinc are rooted in the culture of proactive risk management. We take regular initiatives to promote awareness, discuss risk mitigation, and encourage risk-centric dialogue across our hierarchy. We continuously fortify our risk mitigation and management framework by setting well-defined targets and performance indicators as part of our risk scorecard. Performance evaluation is undertaken at the management and higher levels on a regular basis.

Incentivising Risk Performance

- Annual financial incentives for senior management and employees are linked to their performance on risk and compliance KPIs - proactive risk reporting, timely completion of risk management/action plans, etc.

Promoting Risk Education and Training

- Regular refresher training and awareness sessions for senior management on risk identification, resilience planning and mitigation, as deemed necessary by the Board
- Individual training sessions for Executive and non-Executive Board members, including ARM Committee members, for familiarisation with risk management processes and global risk trends
- Organisation-wide training, workshops and e-mailers on risk management topics and principles to strengthen a risk-intelligent culture

Risk Appraisal for Capital Projects

- 3-step process for capital expenditure risk assessment prior to the approval of both payback and non-payback projects, including new product development projects
- Mandatory risk assessment for capex projects by the project team to highlight critical risks
- Mandatory risk assessment by the central risk team for all growth projects, unbudgeted capex for non-payback projects, and sustenance payback projects above a certain threshold

Incorporating Risk Criteria in Product and Service Development

- Risks are factored into the entire product lifecycle across all stages
- Managing business partner risks with potential to affect the product development process, using risk management frameworks, standard operating procedures (SOPs) and BP management policy
- Rigorous review of product development risks, including changes in customer expectations or regulatory requirements, and their proactive mitigation through necessary process adaptation; the R&D department addresses innovation and product application risks through pre-commercialisation piloting and testing

Focus on ESG Risk Management

- Hindustan Zinc prioritises open and transparent engagement with stakeholders for enhancing trust and driving sustained growth. This is in line with our growing focus on all ESG facets, including the related risks. We strive to maintain continuous interaction with our stakeholders, to understand their perspectives and swiftly respond to the evolving market scenarios
- We conduct materiality assessment to identify topics of significance for our internal and external stakeholders, guiding our strategies for managing the risks and harnessing the opportunities. This robust process strengthens our sustainability approach by facilitating the identification and understanding of the most material ESG priorities
- Climate change & decarbonisation, air emissions & quality, and water management have been identified as the top three material topics for Hindustan Zinc. Biodiversity and climate change are acknowledged as key parameters in enterprise risk management due to their array of associated risks, including regulatory, operational, reputational, financial, market access, and physical risks
- ESG considerations, including biodiversity and climate, are seamlessly integrated into our overall business strategy. From the inception of any project or initiative, we assess its potential ESG impacts and incorporate risk mitigation measures accordingly
- Our ESG risk management process takes a holistic view of risks and opportunities, recognising the interconnected nature of ESG factors to address them comprehensively rather than in silos

To ensure the continual strengthening of our risk mitigation and management framework, we clearly define risk management targets and indicators as part of our risk scorecard. Additionally, quarterly performance evaluation is undertaken at the management level and on a biannual basis for the higher levels.

Risk	Impact	Likelihood	Velocity	Appetite
Environment Regulation				
Local Community Issues				
Structural Stability				
Fall of Ground				
Non-Adherence to Safety Protocols				
Fire				
LME/LBMA Price Decrease				
Tailings Dam Collapse				
Occupational Hazards (Exposure to Gases and Fumes)				
Cyber-Attacks and Data Loss				
Commodity Prices and Supply Constraints				

Risk Rating

Very Low | Low | Medium | High | Very High

Risk Appetite Level

Low | Medium | High | Very High

PRINCIPAL RISKS

Risk 1 Environment Regulation

Risk Domain
Regulatory

Material Topics
M2 | M4 | M7 | M10 | M16

Capitals Impacted

Significance and Impact

Non-compliance with regulatory norms on emissions (SOx, NOx, PM), waste management (hazardous waste, jarofix), effluents management, noise and green belt area poses a significant risk to the business.

Mitigation Plans

- Mechanisms in place to track and monitor compliance with mining and smelting industry norms
- Investment in new technologies to minimise emissions and zero liquid discharge (ZLD) plants in mines to avoid liquid waste discharge
- Waste management techniques, such as dry tailings stacking in place of wet disposal methods, and processing of jarosite with quick lime for sale to the cement industry, etc.
- Upgradation and installation of new systems for statutory licence compliance – new dust extraction system and crusher revamping at mills, and installation of additional wastewater treatment facility at locations

Outlook

Recognising the environmental impact of the metals & mining industry, we remain committed to complying with the emission and waste management regulations, operating within the admissible limits. We constantly strive to maintain our global ESG leadership position by setting ambitious sustainability goals for ourselves.

Risk 2 Local Community Issues

Risk Domain
Reputational

Material Topics
M6 M12 M20

Capitals Impacted

Significance and Impact
Social discontentment, agitations, public protests and disputes can potentially disrupt business operations and impact profitability.

Mitigation Plans
- Robust social strategy encompassing active engagements with communities around operational sites and impactful programmes focusing on education, sustainable livelihood, women empowerment, health, water and sanitation, infrastructure development and environment
- Established a network with law enforcement and local administration
- Monitoring the local ecosystem for potential community discontentment, supported by a structured grievance mechanism
- Augmented security measures at gates and critical/vital installations, along with a crisis communication protocol and escalation matrix for effective crisis response

Outlook
Proximity of our operations to the local communities and the nature of our mining and smelting operations, can potentially lead to agitation of the local communities, impacting our operations. However, with our CSR focus on the comprehensive development of the local communities in and around our locations of operations, we are confident in the continuity of our business without any social discord or unresolved grievances.

Risk 3 Structural Stability

Risk Domain
Operational

Material Topics
M1

Capitals Impacted

Significance and Impact
Failures in structure or equipment (acid tank and roaster dam collapses, smelting furnace and shaft failures) from excessive wear and tear, ageing of assets and improper/inadequate maintenance, may cause injuries, fatalities and operational disruptions.

Mitigation Plans
- SOPs defined for permissible limits and usage of plant equipment, and planned maintenance shutdowns for repair and replacement of ageing/ malfunctioning parts
- Upgradation, repair and redesigning of existing equipment at mining and smelting sites
- Replacement of older equipment with the latest and more robust ones, featuring enhanced design, material of construction (MOC), safety and corrosion resistance
- Remote-controlled operations to reduce manual intervention in structures like acid tanks
- Use of digital initiatives for real-time analysis of indicators signalling equipment degradation and distributed control systems (DCSs) for monitoring process parameters and health of various sections of the plant
- Regular trainings for operators covering operating equipment methods, maintenance requirements, and troubleshooting minor defects at the site

Outlook
Structural stability issues can be attributed to factors including design inefficiencies, extreme operating conditions, such as temperature and pressure, corrosion, etc. We have established sound measures to ensure the structural integrity of our assets. We monitor them regularly using technology-driven scanning and inspections, etc.

Risk 4 Fall of Ground

Risk Domain
Health & Safety

Material Topics
M1

Capitals Impacted

Significance and Impact
Instances of fall of ground (FOG) due to poor geo-tech conditions or heightened seismicity may lead to fatalities, damage to assets such as shafts and equipment, and operational disruptions.

Mitigation Plans
- Integrated critical control management plans, such as FSIPP, for safety across all sites
- Monthly safety trainings and skill upgradation of geo-tech engineers
- Strict adherence to the Ground Control Management Plan (GCMP), annual reviews and implementation of Structural Stability Report (SSR) recommendations, and undertaking regular inspections, damage mapping, timely rehabilitation, and advanced footwall drive cable bottling
- Planned implementation of new-age solutions, such as micro-seismic monitoring and tele-remote operations of the loaders and drill machines
- Action plans for FOG under CRM were implemented in the first phase
- Smooth wall blasting practices in place, and slope stability radar implemented
- Mechanism in place to achieve void reduction, followed by paste-fill optimisation
- Usage of rock breaker in stopes across all locations

Outlook
Underground mining activities inherently come with the risk of fall of ground, potentially caused by the non-predictability of the rock mass properties or increased seismic activity, etc. Our experienced geotechnical team and seismic monitoring technology have minimised the risk from fall of ground. However, any malfunction or human negligence could lead to such incidents.

Risk 5 Non-Adherence to Safety Protocols

Risk Domain
Health & Safety

Material Topics
M1

Capitals Impacted

Significance and Impact
Failure to adhere to safety protocols or errors in judgement by employees/contract workers (man-machine or machine-machine interactions, electrocution, fall from height, explosives handling) may lead to injuries and fatalities.

Mitigation Plans
- Strong safety protocols implemented across all sites, including critical risk management (CRM) and critical control management, such as FSIPP, hazard identification and risk assessment framework
- Implemented digital technologies, such as proximity warning and anti-collision system to prevent machine-machine and man-machine interactions, CCTV surveillance, remote operations and automation across mines, mills and smelters
- Upgradation and replacement of outdated systems and equipment
- Equipment and machinery trainings conducted for business partners, along with monthly safety trainings and lifesaving rules (LSR) in place
- Earth-leakage circuit breaker (ELCB) implementation and neutral grounding resistance for transformers
- Implemented best practices for vehicular safety, such as constructing underground workshops to manage and minimise vehicular movement, enforcing a “Zero” vehicle reversal policy and NO-GO criteria, and designating parking areas and pedestrian pathways
- Remote operations for stope bogging across all mines

Outlook
Safety incidents can happen due to multiple reasons, including human negligence, non-adherence to standard operating procedures, changes in operating circumstances, technology malfunctions, etc. We will continue to strengthen our workforce safety culture and adopt best-in-class technology for safety monitoring.

Risk 6 Fire

Risk Domain
Health & Safety

Material Topics
M1 M2 M10 M16

Capitals Impacted

Significance and Impact
Fire incidents at operational sites pose a danger to life, property, and equipment on site.

Mitigation Plans
- 24x7 preparedness with fire extinguishers, suppression systems, firefighters and rescue teams across all locations. Barriers and protection equipment, including multipurpose tenders, hydrant points, sprinkler systems, etc., are in place to avoid aggravation of fire incidents
- Continuous exploration of new solutions such as new-age firefighting vehicles, auto fire suppression systems, fire hydrant lines, early fire detection systems, fire banks, and fire walls for mills and underground mines. Enhancements of fire safety mechanisms like alarms, sensors and nitrogen purging systems to prevent fire-related accidents in smelters
- Fire safety training and awareness programmes, SOPs, and a fatality and serious injury prevention plan (FSIPP) for all workers in place at all locations
- Storage vessels and piping systems used for fuel storage are grounded and equipped with lightning arrestors, with regular checks on earth connections and resistances
- Ensuring slurry tanks' integrity, earthing, and periodic testing in the Purification Plant at CLZS Hydro 2

Outlook
Recognising the heightened risk of fire-related incidents in working with combustible materials, mishandling of explosives, short circuits, etc., we have established trained rescue teams, fire suppression systems, SOPs, and training & awareness for the workforce to prevent and efficiently handle, if required.

Risk 7 LME/LBMA Price Decrease

Risk Domain
Financial

Material Topics
M18

Capitals Impacted

Significance and Impact
Unfavourable changes in the commodity prices on the London Metal Exchange (LME) and London Bullion Market Association (LBMA) may impact profitability.

Mitigation Plans
- Hedging strategy implemented as per hedging policy to maintain the monthly average LME price on shipments
- Negotiating with customers for higher premiums with 100% sales via e-commerce platform
- Deploying strategies to enhance domestic market share and cost-efficiency through reduction of structural costs
- Diversifying into value-added products and minor metal recovery to buffer against volatile LME and LBMA markets

Outlook
Ongoing geopolitical events could impact the global metal landscape, resulting in some volatility. However, the current prices remain within a reasonable range, with zinc and lead LME prices being forecasted to stay favourable, in the short-term future. The market is also bullish on silver prices in the coming years.

Risk 8 Tailings Dam Collapse

Risk Domain
Sustainability - ESG

Material Topics
M1 M3 M16

Capitals Impacted

Significance and Impact
Any overtopping of tailings, water accumulation during heavy rainfall, increased tailings from declining ore grades, and land acquisition issues necessitating raising the dam height can trigger tailings dam collapse.

Mitigation Plans
- Implementation of dry tailings technology with support from expert agencies
- Bi-annual studies on tailings dam structural stability and ongoing geo-tech monitoring to identify abnormal pressure in embankments
- Regular reclamation and evaporation of water from the tailings dam and construction of additional reservoirs to hold excess water and relieve tailings dam pressure
- Procuring new land for expanding tailings storage facilities and maintaining a design freeboard of 1 metre to avoid any spillover and to maintain buffer space
- Use of high-density polyethylene (HDPE) membrane to avoid seepage on the upstream side

Outlook
Our expanding underground mining operations demand higher tailing storage. Moreover, the deteriorating climatic conditions and the resultant untimely and heavy rainfalls could heighten the risk of tailings overflow. To avoid such incidents, we will continue to take initiatives to reduce the wet tailings and rigorously monitor the structural stability of the tailing dams.

Risk 9 Occupational Hazards (Exposure to Gases and Fumes)

Risk Domain
Health & Safety

Material Topics
M1 M2 M16

Capitals Impacted

Significance and Impact
Exposure to sulphuric acid fumes and hazardous gases, such as carbon monoxide (CO), lead and metal dust, sulphur dioxide (SO_2), chlorine and propane, can pose a serious occupational health risk.

Mitigation Plans
- Regular inspection and audits for internal and external structural integrity and non-destructive testing (NDT) in all smelters
- Online monitoring sensors for hazardous gases like chlorine, LPG, SO_2, etc., across the smelters, coupled with work zone monitoring (cameras) and personal monitoring (attaching sensors on employees for continuous reading) to detect leaks
- Installation of air filters on all equipment with the potential to cause harmful emissions, and tail gas treatment (TGT) systems to reduce emissions of poisonous gases
- Stringent adherence to the use of personal protective equipment (PPE), including gas masks, eye protection and gloves by employees during operations
- Investments in new technologies, such as powered air purifying respirators (PAPR), equipment for manpower, safety showers and diphtheriae kits in acid plants and auto cut-off systems for chlorine tonner leakage

Outlook
Any structural instability, technology malfunctioning or inadequate monitoring, etc., could lead to unfavourable occupational hazards, impeding the business and risking the safety of the workforce. However, by implementing state-of-the-art technology, including sensors and AI/ML, etc., we have significantly minimised such possibilities.

Risk 10 Cyber Attacks and Data Loss

Risk Domain
Cyber, Information and Technology

Material Topics
M17

Capitals Impacted

Significance and Impact
Cyber-attacks (malware, phishing, ransomware), security breaches of information technology/operational technology (IT/OT) systems and loss of confidential/sensitive data such as unpublished price sensitive information (UPSI), generation data, personally identifiable information (PII), threaten operational continuity.

Mitigation Plans
- Incident response and security information and event management (SIEM) implemented for threat detection, compliance, and security incident management
- Up-to-date endpoint security with regular anti-virus, patches and firewall updates and continuous monitoring of traffic
- Annual Certified Security Analyst (CSA) and IT infosec infrastructure configuration reviews
- Manual tagging and control of confidential data, reinforced by BP confidentiality agreements to prevent leaks
- Measures like cloud proxy solutions, endpoint detection and response (EDR) and IT systems hosting on Azure or other cloud systems
- Mandatory virtual private network log-in for employees working remotely and contract staff, ensuring restricted network and database access with multiple security layers
- Other cybersecurity practices and policies are in place, as specified under the 'Cybersecurity' chapter on page 217

Outlook
Despite having state-of-the-art cybersecurity measures and information policies in place, the growing sophistication and coordination of cyberattacks can lead to advanced persistent threats, necessitating the Company to stay ahead of the curve in enhancing its cybersecurity.

Risk 11 Commodity Prices and Supply Constraints

Risk Domain
Strategic/Geopolitical

Material Topics
M19

Capitals Impacted

Significance and Impact
Volatility in coal prices, supply shortages (critical spares, HEMM equipment, explosives, fuel), disruptions in shipping & railway services due to geo-political issues, dependency on critical business partners (BPs), and infrastructure constraints pose a serious business risk.

Mitigation Plans
- Secured coal availability with a strong BP base of direct coal miners, long-term fuel supply agreement with Coal India subsidiaries covering 44% coal requirement, and maintenance of sufficient safety stock
- Adoption of alternate fuels like lignite and biomass, process modification to support greater domestic coal consumption, coal-blending initiatives and focus on renewable energy reduces dependence on coal
- Long-term contracts with major explosives BPs and expanding collaboration with alternate BPs for explosives, tyres, coal and other supplies, including R&D for optimising the operating life of tyres

Outlook
By entering into round-the-clock renewable energy power delivery agreement for 70% of our overall power requirement at a fixed rate, immune to inflation and exchange rate changes, we have insulated significant fraction of our cost from coal price volatility. Although the ongoing geopolitical events might disrupt supply chains for certain commodities, Hindustan Zinc is well-positioned to absorb these impacts with minimal adverse effect.

155 other risks have also been identified beyond the above principal/critical risks. These additional risks are categorised as severe, moderate or acceptable based on their risk scores. Climate change, water management, talent management, etc., are the significant identified risks, graded into severe to moderate categories, based on their impact, likelihood and velocity. Foreseeing their potential to escalate into critical risks in the future, we have proactively initiated mitigation actions to manage them.

EMERGING RISKS

We have identified certain emerging risks that can potentially create a high impact on the Company, but are not likely to materialise in the next five years.

Emerging risks that are currently being monitored are:

Risk 1 Restricted Access to Critical Technologies and Materials

Risk Description
- **Access barriers to green tech:** The global shift toward smart and low-carbon/green technologies and electrification has intensified demand for rare materials and advanced processing capabilities. However, technology gatekeeping, ecosystem dominance, and geopolitical tensions are restricting access to critical technologies, including battery-electric vehicles (BEVs), heavy earth moving machinery (HEMM), and specialised materials like solvents, reagents, proprietary metal refining processes, smart and green technology.
- **Capital and technology barriers:** Rising protectionism and shifting geopolitical alliances may limit access to international capital, complicate long-term investment strategies, and heighten the risk of resource nationalism.
- **Supply chain disruptions:** Supply chain constraints, particularly in the procurement of specialised equipment and critical inputs, continue to pose operational challenges. Geopolitical issues with China may further restrict access to advanced technologies, skill sets and cost efficiencies in the metals and mining space. Additionally, the fragmentation of global trade networks may restrict access to cutting-edge processing technologies and international capital, complicating long-term investment planning.

Possible Impact
- Hindustan Zinc and its associates, such as Hindmetal Exploration Services Private Limited, may face challenges in accessing advanced rare materials technologies, impeding our ability to meet the growing demand for electric vehicles, precision instruments, and other high-tech applications
- Limited availability of BEVs, HEMM, specialised chemicals and advanced technologies may adversely affect our operational efficiency, leading to increased costs and delays in project execution
- Constrained ability to innovate and respond to emerging demands like low carbon metal, such as green metal to cater to global CBAM requirements, may limit growth opportunities in export-oriented markets, especially in jurisdictions with stringent climate policies
- In the long term, these limitations could weaken Hindustan Zinc's competitive positioning in global markets and erode stakeholder confidence, including those prioritising technological advancement and environmental responsibility
- Constrained access and challenges in adopting innovative carbon-reduction technologies may hinder our progress on sustainability targets, exposing us to heightened regulatory scrutiny and reputational risks, loss of stakeholder trust and global market competitiveness
- Imposition of tariffs or sanctions—especially targeting Chinese or Western strategic goods—could lead to cost escalations and restricted market access, hindering our ability to source advanced equipment and impacting strategic expansion plans

Mitigating Actions
- Actively pursuing joint ventures, licensing agreements, and collaborative R&D initiatives with global technology providers, research institutions, and industry consortia to access emerging technologies
- Strengthening internal R&D capabilities, including developing proprietary solutions for metal refining, carbon reduction, and advanced material processing to reduce dependency on external technologies
- Exploring alternative technologies and locally sourced substitutes for critical inputs, such as solvents and reagents, to mitigate supply chain disruptions
- Enhancing supply chain resilience by diversifying suppliers, building strategic inventories, and monitoring geopolitical developments to proactively respond to potential disruptions
- Prioritising investments in renewable energy procurement, low-carbon and emission-reduction technologies, and process improvements, including pilot projects and feasibility studies, aligned with our sustainability goals
- Engaging with industry bodies and government stakeholders to advocate for policies that support technology access, innovation, and sustainable mining practices
- Identifying and qualifying alternate suppliers for equipment across diversified geographies to reduce dependency on any single country or trade bloc

For key initiatives taken by the Company, please refer to the Business Excellence chapter on page 44.

Risk 2 Geopolitical tensions impacting global trade flows

Risk Description

- **Supply chain disruptions:** Ongoing geopolitical tensions threaten Hindustan Zinc's supply chain resilience, disrupting the procurement of raw materials and critical components, specifically coal, strontium carbonate, HSD/LDO, metcoke, explosives, and copper sulphate. This could impact global trade flows, leading to higher logistics expenses and operational inefficiencies. This may possibly necessitate diversifying suppliers or securing long-term contracts at potentially higher costs to mitigate supply risks
- **U.S policy changes:** Policy changes introduced by the newly elected government in the U.S. have created uncertainties around hydrogen projects and renewable energy initiatives, such as strained viability of Fortescue's US$ 900 million investment in Arizona. The suspension of a US$ 300 billion clean energy loan programme could potentially affect global decarbonisation efforts. However, Hindustan Zinc's limited exposure to the U.S. market ensures minimal direct impact on its operations or investments
- **Indonesian Mining Law amendments:** Proposed amendments to Indonesian Mining Laws are aimed at accelerating the development of the mineral processing industry and introducing stricter regulations on mining permits. The Company is expected to have minimal direct impact as these changes primarily target minerals, while its main imports, such as coal, are less affected

Possible Impact

- Policy shifts in the U.S. may delay or cancel projects reliant on clean energy loans, reducing demand for critical minerals like lithium and nickel
- Indonesia's proposed revisions to mining laws could alter export policies, impacting global supply chains for critical minerals. Oversupply of nickel from Indonesia has led to significant price drops, affecting profitability for mining companies
- The EU's initiatives to centralise mineral purchases may influence global trade dynamics, potentially leading to new regulatory requirements for exports
- The potential disruptions in trade routes can increase the cost of importing and exporting raw materials and finished products, affecting Hindustan Zinc's bottom line

Mitigating Actions

- Explore new alternative markets and suppliers to reduce dependency on any single region, especially in light of Indonesia's market influence
- Collaborating with governments and industry bodies in policy discussions can help companies anticipate and advocate for industry-friendly policies
- Proactively monitoring global supply and demand dynamics, adopting advanced technologies, and agile strategies can improve operational efficiency and flexibility, supporting companies in strategic planning and navigating geopolitical uncertainties
- Strategy to focus on the Indian market and increase the domestic market share, and focusing on more resilient and insulated export markets like Southeast Asia and the Middle East
- To mitigate risks arising from geopolitical tensions, Hindustan Zinc ensures operational resilience of critical material through advance booking of critical raw materials and freight, maintaining emergency stock, rerouting logistics as needed, leveraging airlifting options where feasible, and proactively managing inventory to address potential disruptions

Risk 3 Geo-economic constraints on imports

Risk Description

- **Growing carbon regulations:** There is a rising global push for climate abatement leading to the introduction of Carbon Border Adjustment Mechanism (CBAM) in EU and UK. The CBAM liability will include both direct and indirect emissions embodied in imported goods
  - **EU CBAM:** By 2027, the EU importers will be charged a carbon price on their Scope 3 emissions on steel and aluminium imports from carbon-intensive importers, expanding to all products by 2034
  - **UK CBAM:** Set to be introduced in January 2027, it will initial cover emissions-intensive goods from sectors such as aluminium, cement, fertilisers, hydrogen, and iron and steel. The UK government has published draft primary legislation for technical consultation, aiming to ensure the policy is effective and reduces carbon leakage
  - **Effect on Hindustan Zinc:** The proposed 25%-30% tax presents minimal direct impact on the Company, as it does not have a high exposure to the EU market. However, there may be indirect effects if Hindustan Zinc supplies to steel makers who export to these regions, potentially affecting demand and pricing

Possible Impact

- The demand for Indian steel exports and thereby zinc, which is used in steel galvanisation, may get impacted, leading to lower unit costs and premiums. Moreover, these tax mechanisms could extend to zinc, a carbon-intensive industry, resulting in inflated imported zinc prices and reduced competitiveness against domestically produced zinc in the EU. This could force Hindustan Zinc to explore alternative markets or invest heavily in decarbonisation technologies to retain its market share
- Increased costs for steel/zinc producers outside the EU to reduce their carbon footprint for maintaining compliance with the EU's climate policies, potentially affecting revenue and EBITDA of those exporting to the EU. The Company may face margin pressures and higher capital expenditures to meet these stringent requirements, thereby impacting its financial stability and growth plans
- Companies with lower carbon footprints will gain a competitive edge in the EU market. If Hindustan Zinc's carbon emissions remain high, it risks losing market share to greener competitors

Mitigating Actions

- Exploring alternate export markets that haven't levied these taxes
- Transitioning towards renewable energy to produce more green products, which will help meet the growing emission targets set by different countries. Building its own green portfolio, Hindustan Zinc has already launched Asia's first low-carbon green zinc, EcoZen
- Our decarbonisation efforts such as 15% GHG intensity reduction from base year FY2020 and 70% renewable energy target by FY2028 position us well to be prepared for EU/UK CBAM