

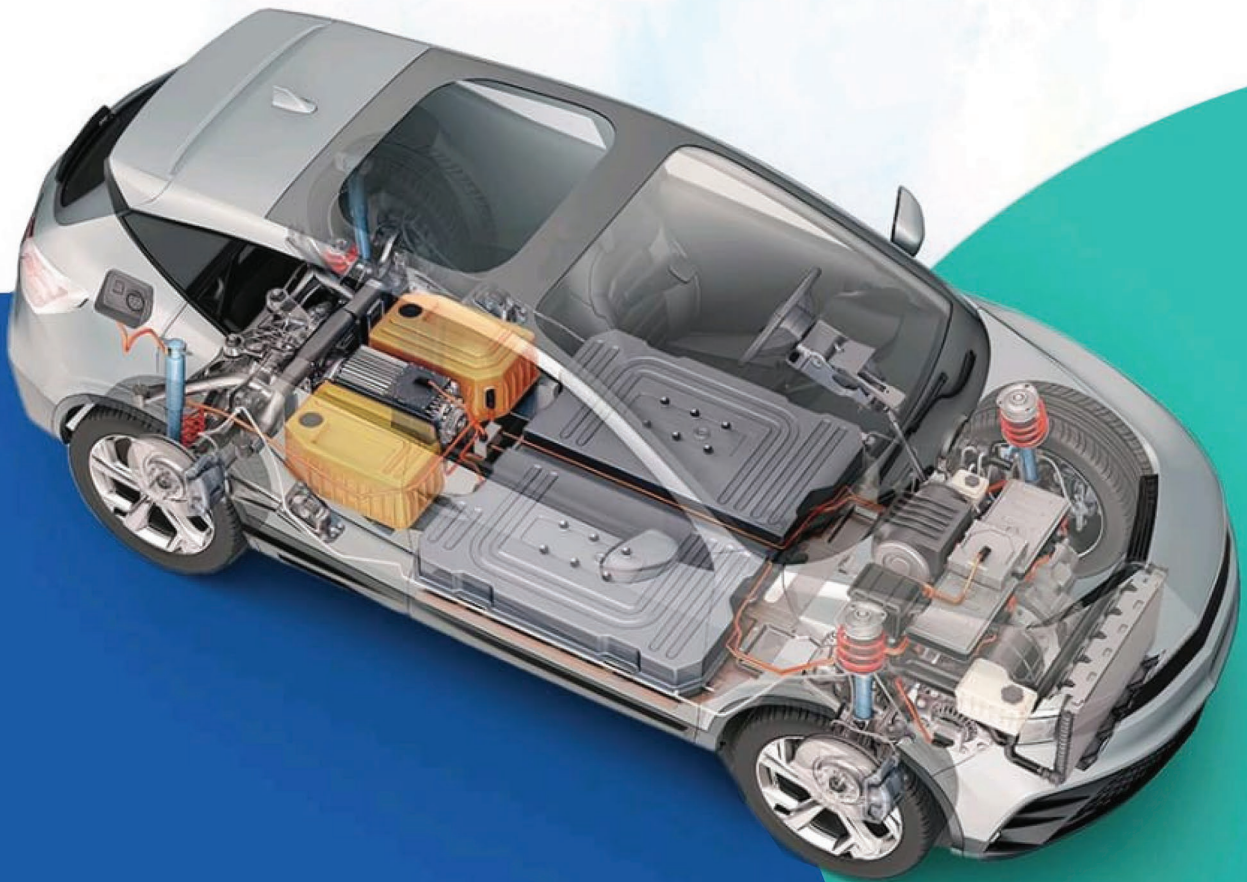
# TCFD

TASK FORCE ON  
CLIMATE-RELATED  
FINANCIAL  
DISCLOSURES

TCFD Report 2021-22



GREENER  
STRONGER  
SMARTER



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# About the Report

Hindalco Industries Limited is a metals flagship company of the Aditya Birla Group. We are the world's largest Aluminium rolling and recycling company and a major Copper player. We are also recognised as one of Asia's largest producers of primary Aluminium. We maintain a presence throughout the manufacturing value chain from bauxite mining, alumina refining, coal mining, aluminium smelting to downstream rolling, extrusions, and foils. We operate Asia's largest custom single location copper smelter in Dahej, Gujarat.

Driven by our purpose of building a Greener, Stronger, Smarter world, we provide innovative solutions for a sustainable and prosperous planet. Our core focus as a company is to provide high-grade, environmentally friendly products across our business portfolio which is achieved through robust and significantly optimised manufacturing practices and capabilities. We focus on our ability to bring the best possible value to all our people and stakeholders.

Being cognisant of the impacts of climate change on businesses and the pressing need to transition to a lower-carbon economy and adapt to the deteriorating conditions, we are continuously evolving our understanding of the challenges around this issue and working on how we can integrate it in our strategic decision making and business processes. In line with this, Hindalco has embarked on a journey to align its disclosures to the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD). The TCFD structures its recommendations around four thematic areas that represent core elements of how organisations operate: governance, strategy, risk management, and metrics & targets. These thematic areas are designed to interlink and inform each other.

Using the TCFD framework, this report provides an insights and progress update across each of the TCFD pillars for FY 2021-22 covering the Hindalco India operations and few best practices from our subsidiary Novelis (Novelis is the leading producer of flat-rolled aluminum products and majorly focuses on aluminum recycling). The report sets out our current understanding of the strength and resilience of our strategy and business model under different climate scenarios. The process of climate scenario analysis is rapidly evolving, and it is iterative. We expect the approaches, tools, and data quality to mature over time, which will contribute to our understanding of climate risks and opportunities. As we continue to accelerate the transformation of our value chain, these assessments will be integrated into our strategic planning and enterprise risk management frameworks to help strengthen our resilience and adaptation to climate change.

# Message from the Managing Director

Dear Readers,

I am delighted to present to you our first comprehensive Climate Disclosure for fiscal year 2021-22 as per the Task Force for Climate-related Financial Disclosures (TCFD) recommendations. This report is a reflection on the Aditya Birla Group's commitment to sustainable business practices. We acknowledge that we have a crucial role to play in addressing climate change and are committed to achieve Net Carbon Neutrality at Hindalco by 2050.



In recent years, our country has seen a challenging journey and complex recovery from pandemic shocks, reigniting debate about global collective efforts towards sustainability. At the 26th Conference of the Parties (COP 26) at Glasgow, we witnessed those efforts put into action as nations, including India, announced their decarbonisation ambitions. Global alliances such as Glasgow Financial Alliance for Net-Zero (GFANZ) pledged \$130 trillion towards climate action and jumped on board to work on the common challenge. These activities demonstrate the worldwide effort to address climate change and the necessity for companies to focus on decarbonisation. With the increased focus on transitioning to a low-carbon economy, more extensive, accurate, and comparable climate-related disclosures are required. The TCFD guidelines are guiding us in not just reporting our climate-related performance in the most reliable manner, but also in standardising our internal procedures with regards to our climate strategy.

Our climate strategy and risk management have Board oversight and a robust multi-tier governance structure for effective administration. In addition to long-term target of achieving Net Carbon Neutrality by 2050, we are steadily progressing on our 2025 target of achieving 25% specific GHG emissions reductions with FY 2011-12 baseline and already achieved 18.5%. We also adopted an

Internal Carbon Price of \$31 from this year which will help us in putting a cost for CO<sub>2</sub>e emissions internally and will aid in managing climate-related risks. Moreover, we are increasingly focusing on catalysing the national decarbonisation by co-developing carbon efficient products. This report provides details on our plans and actions for our decarbonisation journey and how we are enabling others in their journeys as well.

We have already seen an increased demand for low carbon products, and we are expecting it to rise multi-fold in the coming years. For the same, we have a large pipeline of projects with potential to cater to company-wide and national decarbonisation plans. We know that we have embarked on a long-term voyage and we assure that our efforts will only become more sincere, vigorous and transparent going forward.

We are certain that our approach will enable us to contribute to the global climate action. We invite you to go through the report and offer us with your valuable feedback. Thank you for your continued support and trust that has inspired us through decades.

Sincerely,

**Satish Pai**  
Managing Director

## Executive Summary

Hindalco has always strived towards progressing on its climate change journey and one of the prime examples is our ambitious commitment of Net Carbon Neutrality by 2050. As one of the leaders in metals and mining industry, we understand that our business is highly energy intensive and we consistently work towards reducing our footprint. As a proactive step, we have also committed to Science Based Targets initiative (SBTi) and are actively working to limit our emissions using various decarbonisation interventions. We take the agenda of climate change seriously in our organisation and have integrated TCFD recommendations in our daily business operations.

Primary aluminium production is an energy intensive process as the smelters require large amounts of energy, which is available round the clock. Hence, generally smelters in India rely on captive thermal power plants which brings a challenge for us to transit towards low-carbon operations. Nevertheless, we are consistently working on using low-carbon alternate fuels to run our boilers and utilising renewable energy in our operations, wherever feasible.

We acknowledge the importance of having a robust governance structure for managing our climate-related risks and opportunities. Our Board has clear oversight on climate-related issues as they are quarterly updated with recent developments in this space. They also take relevant actions and provide guidance to our senior management on periodic basis. We also have an Apex Sustainability Committee (ASC) chaired by our Managing Director,

who is our chief executive and has primary responsibility of driving climate change agenda across the Company with support of the Chief Sustainability Officer. The ASC is further supported by dedicated sustainability teams at cluster, department, and site level, which helps in effective implementation of climate change agenda.

We have integrated climate-related risks and opportunities in our strategy by conducting detailed scenario analysis to understand impact of climate change on our organisation. We have used Intergovernmental Panel on Climate Change's (IPCC) Representative Concentration Pathway (RCP) scenarios to evaluate the effect of long-term change in temperature and precipitation at our sites along with relevant climate-related risks and opportunities. We recognise that some of our sites possess high risk of climate change and are implementing resilience measures to mitigate the same. We have also tapped several climate-related opportunities by developing diverse product portfolio and collaborating with other sectors to help them decarbonise.

We have implemented robust enterprise risk management framework across our organisation. We have also developed risk resilience plan to ensure that the impact of identified climate-related risk is minimised and there are no substantial disruptions in our operations. Our Risk Landscape, updated every year, details our top risks and relevant mitigation measures taken for the same. The identified climate-related risks are also integrated in our overall risk management framework and are

closely monitored. The risks, including climate-related risks, are managed by comprehensive risk governance which is spread across the organisation. We intend to remain updated with upcoming potential risks and take proactive steps to ensure our resilience against the same.

We firmly believe in progressing on our climate change agenda and for the same, we have taken ambitious commitments on GHG emissions, renewable energy, water and other climate-related targets. We also continuously monitor and disclose our climate-related metrics such as Scope 1 emissions, Scope 2 emissions, renewable energy consumption, water withdrawal, and others. The climate-related metrics and targets help in focussing our efforts and understanding our progress on combating climate change.

Going forward, we intend to further enhance our understanding of climate-related risks and opportunities and alignment with TCFD recommendations. We acknowledge that moving towards a low carbon energy mix could be a challenge, however, we already are on the journey to transit towards a low carbon business and developing a future roadmap for accelerating the same. We intend to disclose our progress on climate change in our annual disclosure, collaborate with partners and consistently deliver long-term value to our stakeholders.

# Governance

## Governance around climate-related risks and opportunities

Hindalco has always strived for establishing highest level of governance in the organisation. It plays a pivotal role in driving the climate change agenda across the organisation. We have a robust multi-tier governance with Board Oversight on climate-related issues. In this section, Hindalco's governance on climate-related issues and risks are outlined.

### Alignment with TCFD Recommendations – Governance

Describe the board's oversight of climate-related risks and opportunities

Describe management's role in assessing and managing climate-related risks and opportunities.



## Hindalco's Risk and Sustainability Governance Structure<sup>1</sup>

Governance is one of the most vital component of a company's climate risk framework. This pillar covers governance framework, the roles, responsibilities and decision-making procedures by which a company adheres to its climate-related commitments. We have a robust Governance structure to identify and mitigate climate-related risks and opportunities. The details of our Governance are given below:



<sup>1</sup> Only committees and/or teams with allocated roles and responsibilities related to climate change or risk management are mentioned across the governance structure

# Governance

Hindalco's has a robust multi-tier governance, spread across the organisation at various levels, for managing climate-related issues. The governance structure given above illustrates the relevant committees and/or teams involved in climate change agenda. The details of each tier is given below.

## Key decisions taken by Board-level R&ESG committee

- Net Carbon Neutrality and water positive commitment
- ESG 2050 commitments
- Exploring low carbon energy sources and technologies to power Aluminium Smelters
- Downstream Strategy

## Key decisions taken by Apex Sustainability Committee

- Internal Carbon Pricing
- Renewable energy strategy
- Implementation of innovative technologies/approaches like Carbon capture, red mud neutralisation with CO<sub>2</sub>, Zero Waste to landfill,
- Water positivity related strategy and approaches, rainwater harvesting, Healthy watershed management
- ZLD commitment and water security strategy
- Specific freshwater reduction target for 2025 from baseline of 2019 and Per capita water consumption targets for townships
- Storm water and Process water drain segregation and site wise resource deployment
- Pilots adopting new technologies in clean air, waste utilisation, water reuse and recycle at various sites of Hindalco, resources to be deployed
- Biodiversity related plans, execution and status update at Mines and other operations sites
- Green belt enhancement at all the sites and closing the old red mud dams and ash ponds with capping and green belt developments all across Hindalco

## Board Oversight

We believe in implementing sound governance practices which start with ensuring Board oversight on material issues. The Company's Board of Directors ("Board") is regularly engaged on sustainability agenda, including climate change, and have clear oversight on the same. The Board periodically reviews progress on the agenda and provides guidance to enhance the performance. The Board has delegated primary responsibility of oversight on sustainability to Risk Management and

## Management's Role

Hindalco has a dedicated committee – Apex Sustainability Committee (ASC), which is primarily responsible for taking key decisions on sustainability agenda, including climate change. The ASC reports to Board-level Risk Management and ESG Committee, updates them on quarterly performance of the Company, including climate-related performance, and takes their guidance on strategic decisions. The ASC is chaired by Mr. Satish Pai, MD who has overall responsibility to assess and manage climate-related risks and opportunities along with driving the sustainability agenda across the organization.

The MD has dedicated sustainability-related KRAs, including climate change, and the variable compensation is also linked with the same. The ASC also looks after developing and implementing strategies, in accordance with Board's guidance, and driving the overall sustainability agenda in the Company. The ASC also develops strategic goals and targets along with frameworks for monitoring performance across various aspects of climate change including Water risk management, energy conservation, GHG emissions, renewable energy, and others. The ASC dedicates a separate time to decarbonization and climate change related matters.

The ASC also includes representation from other senior leadership personnel including

ESG Committee and the chairman of the committee reports to the Board.

The Risk Management & ESG (R&ESG) Committee is updated quarterly on potential risks, including climate-related risks, by senior management of the Company. In meetings conducted by R&ESG Committee during FY 2021-22, climate change came out as a key discussion agenda and various related issues such as renewable energy, low-carbon products, environmental commitments, and others were also discussed in the meetings.

Chief Risk Officer, Chief Sustainability Officer, Head of Manufacturing Centre of Excellence, Chief Technology Officer and Head of Energy and Clean Energy. The Chief Risk Officer is primarily responsible for driving Enterprise Risk Management function in the Company, including identifying and assessing climate-related risks. The Chief Sustainability Officer along with Head Energy and Clean Energy, are primarily responsible for driving sustainability, including climate change agenda in the Company.

Manufacturing Centre of Excellence (MCOE) head conducts monthly operations review of each vertical- Copper, Power, Smelter, Refinery and Downstream with focus on energy and resource efficiency. The MD also conducts monthly and quarterly business reviews covering performance against planning and budgeting (P&B). In addition to the above, we have a Business Review Council at the Group, reviewing progress on these targets on a quarterly basis.

## Organisation-wide Teams

Hindalco's risk and sustainability governance is spread across the organisation to ensure effective implementation of strategic decisions taken by ASC. The structure includes dedicated teams at various levels such as corporate, clusters, departments, and sites to comprehensively manage and

drive the climate change agenda. At all these levels, dedicated key personnel are appointed to take strategic actions and help in achieving the targets. Moreover, to ensure ownership of sustainability at the root level in the organisation, we follow a 3C+2S framework (Customer, Cost, Cash, Systems & Processes, Sustainability & Safety) for setting KRAs of our employees. One of the S in the framework stands for Sustainability and Safety, hence sustainability becomes a factor in calculating variable pay of employees. To further enhance the same, we have now initiated the business performance part of the variable pay linked to sustainability, including climate change. The details of two functions – sustainability and risk management function and its organisation widespread is given below.

## Sustainability Function:

Hindalco's robust governance includes dedicated teams for effectively implementing sustainability initiatives, including climate change, across the organisations. For every cluster of Hindalco, cluster sustainability heads are appointed who have overall responsibility to drive sustainability agenda for their respective cluster. The cluster heads are supported by sustainability professionals at each site. Apart from dedicated resources working on sustainability, Hindalco has set up task forces for waste, water, biodiversity, air emissions management, including membership from core functions to ensure sustainability is driven in each function and vertical.

## Risk Management Function:

We also have a robust risk management governance to ensure resilience against relevant risks, including climate-related

risks and implementing a sound risk culture. Risk Managers are appointed at cluster-level to effectively assess and manage relevant risks across the cluster. For department-level risk management, Risk Co-ordinators are selected. Also, for sites, Risk Champions are appointed to effectively implement risk mitigation strategies. For more information on managing risks, please refer the section – Risk Management.

## Energy and Green Energy Function:

We also have a dedicated Energy and Green Energy function which primarily looks at energy consumption of the organisation and enhancing green energy (renewable energy) component in our overall energy consumption mix. At various levels in the organisation, the responsibilities of monitoring and managing energy consumption is distributed. We have appointed a Head – Energy and Green Energy who has an overall responsibility and Energy SPOCs are appointed at all the sites to effectively manage the energy consumption at site-level. Their function is to collectively manage energy consumption, identify opportunities to increase renewable energy and implement relevant interventions to meet the climate change targets of the Company.

## Our Policies

Hindalco has implemented relevant sustainability and climate-change policies to ensure effective implementation of strategies devised on sustainability and achieve targets. Details of risk and sustainability-related policies are given below.

## Energy and Carbon Policy

The Carbon and Energy Policy covers Company's aspirations on efficient energy

consumption, renewable energy and enhancing carbon performance. It also covers developing relevant mechanisms to measure, monitor and report energy consumption and carbon emissions in annual disclosures. To access the full policy, please [click here](#).

## Environment Policy

The Environment Policy talks about Hindalco's ambition to continually improve its environmental performance for sustainable operations and responsible growth globally. The policy covers Company's aspirations to conserve natural resources, minimise waste, integrate recycling and reusing concepts, including many others. To access the full policy, please [click here](#).

## Risk Management Policy

Hindalco also has developed and implemented a comprehensive risk management policy, which is authorised by the Risk Management Committee. This policy forms the core of Company's risk management framework and institutionalises a holistic risk management approach encompassing all functions. To access the full policy, please [click here](#).

## Sustainability Policy

The Sustainability Policy frames a pathway for Hindalco which leads to sustainable operating practices including creating long-term value for stakeholders, protecting environment, nurturing people and more. The policy also covers Hindalco's aim to ensure the presence of a strong governance structure, regulatory compliance, incorporating sustainability considerations in business decisions. To access the full policy, please [click here](#).

"We are always working towards encouraging change that facilitates corporate and societal sustainability, as well as developing honest connections with our stakeholders. At Hindalco, working our part towards climate change has emerged as our key focus area in recent years. From adopting internal carbon pricing, performing scenario analysis, bio diversity and green belt enrichments, developing climate resiliency and progressing our way towards Net Carbon Neutrality, we took some bold steps this year. Going forward, we only aim to succeed even more in our decarbonisation and resiliency journey."

- Vaishali Surawar, Chief Sustainability Officer

# Strategy



The Strategy pillar of the TCFD disclosures provides information on company's exposure to climate-related risks and opportunities, as well as its response to them and how those are integrated in the overall business strategy. In alignment with TCFD recommendations, we have assessed various climate-related risks, defined resilience measures that are adopted to minimise the risk impact and have explored the resulting opportunities. Decarbonisation has been identified as one of the top risks faced by the Company and we have committed to become Net Carbon Neutrality by 2050.

## Alignment with TCFD Recommendations – Strategy

Describe the climate-related risks and opportunities the organisation has identified over the short, medium, and long-term

Describe the impact of climate-related risks and opportunities on the organisation's businesses, strategy, and financial planning.

Describe the resilience of the organisation's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario

### Our Climate-related Risks and Opportunities

At Hindalco, we have integrated climate-related considerations in our business strategy, operations and financial decision-making processes. This includes identification of climate-related risks and opportunities in different time horizons, conducting scenario analysis to understand the impact of these risks, implementing resilience measures against these risks and tapping new opportunities to consistently deliver long-term value to our stakeholders.

We mapped the plausible business impacts of the following categories of risks and opportunities:

- **Transition Risks:** Transition risks are enterprise risks that arise as a result of societal and economic transformations toward a lower-carbon, more environmentally friendly future. These risks can include policy and regulatory and legal risks, technological risks, market risks and reputational risks. These areas can vary in terms of their type, focus and geographical acceptance, which can have a financial implication for our business.

- **Physical Risks:** Physical risks are a result of short-term catastrophes (acute) or long-term variations in climate patterns (chronic). Acute physical risks are those that are triggered by a specific event, such as extreme weather events like cyclones, storms, or floods. Whereas longer-term changes in climatic patterns (e.g. prolonged higher temperatures) may produce sea level rise or chronic heat waves, which are referred to as chronic physical hazards. These can also result in increased frequency of acute risks over time.

### Climate-related Opportunities:

Climate change mitigation and adaptation efforts can provide advantages to businesses, such as resource efficiency and cost savings, adoption of low-emission energy sources, creation of low carbon footprint products (white goods, building and construction sector) and services, light weighting the segments like transportation, access to new markets, and supply chain resilience. We have proactively tapped into climate-related opportunities by integrating them in our business strategy.

We have conducted a detailed climate risk and opportunities assessment this year to understand impact of climate change on our operations. We also have developed effective resilience measures against the climate risks we have identified and strategies to utilise climate opportunities.

A brief on climate risks is provided below including type of risks, their relevance, timeframe, plausible impact, and likelihood along with resilience measures. For the time-horizon, we have considered period of short-term as 0 to 3 years, medium-term as 3 to 10 years and long-term as 10 to 99 years.

# Strategy

## Transition Risks



### Regulatory Risk

Time frame: Short-term & Medium-term

Impact: ■

Likelihood: ■

#### Risk

The regulatory space in India as well as globally has become quite dynamic, including regulations on climate change. Also, as India has recently taken a target of net-zero carbon emissions by 2070, we believe that the regulatory landscape will further change. Also, frequent changes in rules and regulations of bauxite and coal mining and ownership are a risk which can affect cost and availability. These changes might have a potential to impact on us and thus become a relevant risk.

#### Resilience Measures

We have implemented a robust compliance management system which takes care of our adherence to all relevant laws and regulations. It also notifies the relevant team on upcoming regulations and thus helps us in minimising regulatory risk. We have dedicated resources for corporate affairs and public policy, responsible for communication with regulators.

We have a digital compliance tool through which unit wise compliances are tracked and we conduct internal audits led by our legal wing to ensure compliance.



### Market Risk

Time frame: Medium-term & Long-term

Impact: ■

Likelihood: ■

#### Risk

As the global landscape is changing with more focus on climate change related aspects, customer demands, and preferences are changing. The awareness on climate change is rapidly increasing in society and several researchers have shown a customer shift towards products with lower environmental impact (such as eco-friendly, Green, recycled, less energy-intensive, and other similar products). This changing demand in market poses a risk to our business and products.

#### Resilience Measures

We had already anticipated the market change and have developed plans to meet the new requirements. There have been consistent efforts to enhance our Downstream Value-added product portfolio, which utilises less energy to develop products in comparison to primary aluminium production. We also have put focussed efforts on developing low carbon products and collaborate with other sectors to provide energy efficient solutions, more details of the same are provided in Carbon-related Opportunities. Our new product strategies and on-going projects will help us meet changing customer demands and minimise the market risk.

Low ■ Medium ■ High ■

## Transition Risks



### Technology Risk

Time frame: Short-term & Medium-term

Impact: ■

Likelihood: ■

#### Risk

The technology space has been on accelerating pace and companies are adapting to newer technologies to enhance their productivity and meet their targets. As our systems and processes are also dependent on technology, this becomes a potential risk to us.

#### Resilience Measures

We have always strived to implement state-of-the-art technologies across our plants. As an example, we have patented in-house energy conservation technology in smelting process, and it is showing good results. Also, with increase in digitisation and dependence on information technology systems, data security has become an important aspect of business. To ensure data security and protect data of our operations and consumers, we have implemented the Information Security Management System (ISO 27001) across all our operations. With the help of these advancements, we leverage the technology in our growth and minimise the risk.



### Reputational Risk

Time frame: Medium-term & Long-term

Impact: ■

Likelihood: ■

#### Risk

The Company's reputation amongst its stakeholders is of prime importance. As we are progressing on our climate change journey, we have taken ambition targets including Net Carbon Neutrality by 2050, Zero Liquid Discharge status across all sites by 2025, and others. It becomes a potential risk on our reputation in case we fail to achieve our targets.

#### Resilience Measures

Reputation plays a very important role in Hindalco and for the same, we believe in standing for what we commit. For the targets we have undertaken, we have developed detailed roadmaps along with milestones, interventions required and robust review mechanism. There are dedicated teams identified to implement the projects and achieve the targets. We also have a mechanism to align the respective employees' KRAs to sustainability-related targets. These processes help us in minimising our reputational risk.

# Strategy

## Physical Risks



### Acute Risk

Time frame: Short, Medium-term

Impact: ■

Likelihood: ■

#### Risk

Weather events have increasingly become more severe and frequent. This can increase the Company's exposure to hazardous incidents, and thus, reduction in production capacity, damage to capital and assets, negative impact on stakeholder health, and disruption in raw material transport and availability.

#### Resilience Measures

We have been thoroughly studying the potential impacts of extreme weather events on operations, employee well-being and supply chain over the years. We have not only responded to every calamity rapidly but have also developed standard operational practices to tackle futuristic extreme weather events.

These measures include operational and infrastructural design changes, setting up pre-monsoon and summer preparedness plans, adopting employee well-being measures, increasing the frequency of mock-drill, increasing raw material stocks, enhancing raw material protection from rains, increasing supplier geographical diversity, and appointing separate accountable teams to tackle such weather events. These, along with other resilience measures for each weather event is specified below in the Physical Risk section.



### Chronic Risk

Time frame: Long-term

Impact: ■

Likelihood: ■

#### Risk

The recent report by Intergovernmental panel on climate Change (IPCC) Assessment Report 6 has established a direct correlation between GHG emissions, global temperature change and increased weather events. Seasonal chronic variations can possess a risk of combined extreme weather events, with augmented exposure to physical risks over the time. This can include increased impact and frequency of heavy rainfalls, droughts, cyclones, and other events.

#### Resilience Measures

To understand the chronic risk variability over the years, we conducted a long-term scenario analysis for all our sites as per different RCPs. This gave us a better outlook of precipitation and temperature variability over different geographies. With a better understanding, we have already started integrating our resilience measures with the study outcomes. This includes incorporating Zero Liquid Discharge at drought prone sites and enhancing weather forecast monitoring systems amongst numerous combined measures to strengthen our acute and chronic risk resilience.

Low ■ Medium ■ High ■

Climate change not just presents risks to our operations, but we also believe that it presents opportunities for us to develop a refreshed business strategy, so we can support our customers in their decarbonisation journeys as well. Some of the climate related opportunities that Hindalco is keenly pursuing are listed below:

## Climate-related Opportunities



### Resource Efficiency

Time frame: Short, Medium-term

Impact: ■

Likelihood: ■

#### Opportunity

Improving resource efficiency by reducing, reusing, and upcycling resources are embedded in Indian cultural ethos. This behaviour is followed diligently at our Company, which further results in cost savings and financial opportunities. Energy efficiency serves not only as a major opportunity to reduce operational costs but is also one of the three decarbonisation levers for our Company. Similarly, water efficiency can not only reduce financial spending, but also help us against drought and regulatory risks. Material optimisation has also been a major focus area to reduce dependency on raw resources from natural resources. Thus, we take a multi-faceted approach to resource efficiency, which allows us to reduce the use of virgin resources and increase the use of recycled input materials.

Thus, resource efficiency results in direct cost savings to the Company' operations over the short to medium-term and contributes to the global efforts towards sustainable goals.

#### Response to Opportunity

We are taking pro-active steps towards resource efficiency. This includes investment in efficient technology and energy conservation practices in operations. These practices resulted in cost savings of ₹ 1468 Million during FY 2021-22.

For water conservation, our initiatives include construction of rainwater harvesting ponds, reservoirs, and reuse of treated effluent. Further, we are moving towards incorporating ZLD at all our plants for increased recycling of water.

Also, we are focusing on increasing the percentage input of recycled material for our production. Aluminium's intrinsic qualities make it 100% recyclable. At several downstream locations, we have reverse supply contracts with our select customers to send back aluminium scrap to us for remelting with our new technologies, we will continue to ramp up the utilisation of recycled content to improve operational efficiencies and sustainability in our product portfolio through aluminium waste and residue recycling. We also developed new ways to use scrap from our Copper activities in addition to Aluminium.



# Strategy

## Climate-related Opportunities



### Energy Source

Time frame: Short, Medium-term

Impact: ■

Likelihood: ■

### Opportunity

The renewable energy industry is growing faster than ever. With growing support from government, ongoing research and development, and financial support from financial groups such as Glasgow Financial Alliance for Net-Zero (GFANZ), the price of renewable energy has declined drastically. Now, purchasing and investing in alternative energy options such as wind, solar, wave, tidal and hydro not only results in carbon savings, but also is a financial opportunity for us.

### Response to Opportunity

With a current renewable energy capacity of 100 MW and the target to achieve 300 MW by FY 2024-25, we have recognised and adopted practices towards alternative energy sources at our plants. This opportunity falls under our decarbonisation pillar of changing energy mix to achieve our carbon emission targets. We are also exploring opportunities for the implementation of solar hybrid and storage, floating solar options and Carbon Capture and Storage (CCUS) projects in future.



### Products/ Services

Time frame: Short, Medium-term

Impact: ■

Likelihood: ■

### Opportunity

With the shift in stakeholder demands and need towards low carbon products, a substantial growth is expected in low carbon goods and services such as, Electric Vehicle industry and light-weighting of Automotive industry. Aluminium usage for enhanced thermal insulation in buildings can increase its energy efficiency through reduced heating and cooling. Furthermore, increased stakeholder concerns about environmental issues may help to facilitate the move away from plastic packaging to aluminium packaging. These demands can induce a large growth in aluminium demand and is therefore an opportunity for us.

### Response to Opportunity

Our Company is already acting as a catalyst towards national decarbonisation by accelerating production of low carbon products. Our focus is only going to increase in the future. Along with light-weighting, EVs, aluminium based packaging and cladding for thermal insulation, we are also looking towards supporting in solar rooftops in future. More information about our initiatives can be found in 'Climate-related opportunities' section.

As a result, our services have a positive influence on the environment, society, and value chain participants. Customers may use our services to replace resource-intensive and polluting products, minimising supply chain risks and reducing their product's environmental footprint.

Low ■ Medium ■ High ■

## Climate-related Opportunities



### Market

Time frame: Medium, Long-term

Impact: ■

Likelihood: ■

### Opportunity

The global energy transition has increased access to new markets for several industries providing low carbon products and services. Global collaborations with OEMs, EV manufacturers and government brings up new market opportunities for our Company as we move towards a low carbon economy. Aluminium, owing to its light-weight and versatility plays an important role in the manufacturing of those products and services, and thus our customers are increasingly focusing on co-developing low carbon solutions. Furthermore, stakeholders and government regulations are demanding recycled aluminium and copper metals going forward.

### Response to Opportunity

We are investing in research and development to create optimum solutions as per changing customer demands. Our collaborative efforts include working with governments on light-weighting of railways and with major automobile players for battery efficiency and light-weighting. We are also looking towards manufacturing cladding for thermal insulation and working on solar rooftop solutions. We are increasingly approaching new partners as the market opportunities grows. Considering the increase in demand for Air Conditioning going forward, we are investing on Inner Grooved Copper Tubes for use in Air Conditioners.



### Resilience

Time frame: Medium, Long-term

Impact: ■

Likelihood: ■

### Opportunity

As we make organisational and behavioural changes to achieve a low carbon future, we are also building resilience towards transition and physical climate-related risks. Our processes and products will have low chances of impact from regulatory strictness or changing customer demands. Thus, we see climate action as a resilience opportunity also.

### Response to Opportunity

Improving efficiency, designing new production processes and developing low carbon products are some practices that we are focusing on in our climate action plan. We have also incorporated Internal Carbon Pricing to make strategic decisions and financial investments considering the climate impact. These practices will reduce the risk of carbon taxation and cross border financial implications such as CBAM. Also, our proactive measures towards employee well-being, supply chain disruptions and operational practices are building resilience against extreme-weather events.

# Strategy

## Our Path to Decarbonisation

As the stakeholders are gaining more awareness on the consequences of climate change, businesses are shifting their operations and behaviors towards low carbon economy. Standing in line with global commitments and ambition to limit the global warming to 1.5 degrees Celsius, we have taken a commitment to reach "Net Carbon Neutrality" by 2050. This is accompanied by our target to reduce 25% specific GHG emissions by FY 2024-25 from base year FY 2011-12. As a major aluminium and copper producer, we intend to lead the decarbonisation journey of our sector and help other sectors decarbonise as well. During the recent Investor presentation, Our MD reaffirmed our commitment as he said "We are building a model through the science-based target, with specific targets to be put for every 5 and 10 years and we will make our best

efforts to reach that goal. Hindalco as a technology leader we are playing our part in trying to be at the front of that game, taking different projects, whether they are carbon capture and utilisation, or green hydrogen or using natural gas in the boilers. We are trying to be on the forefront of some of that experimentation and pilot projects that have to happen before we can actually reach that goal".

Primary aluminium production is an energy intensive process as refined ore, aluminium oxide (alumina), requires electrolysis. Electrolysis in an aluminium smelter requires large amounts of round the clock energy, hence smelters in India rely on captive thermal power plants. Aluminium, on the other hand, is eternally recyclable, and secondary aluminium production uses 95 percent less energy than primary aluminium. Therefore, we are focusing on increasing energy efficiency

and recycling in our operations to reduce the carbon footprint of our product portfolio.

Also, its light weight offers opportunity to reduce energy consumption and carbon footprint in other sectors. It shall have a considerable impact in reducing GHG emissions in automotive through light-weighting of vehicles and also in electric vehicles as aluminium is utilised in housing the battery and motors. It could also be used to replace plastic packaging for food and pharmaceuticals all whilst acting as a catalyst for more sectors. Aluminium has a long life because of its high corrosion resistance property which extends the extraction of virgin raw material and further helps in reducing emission from upstream value chain. We understand that aluminium not only saves energy and CO<sub>2</sub> during use, but it also has the potential to transit manufacturing towards low- carbon processes.

- **Energy Efficiency:** Investment in efficient technology and energy conservation in operations are the main pillars to reduce our energy consumption and GHG emissions. Through these initiatives, we have achieved 18% reduction in specific energy consumption and 18.5% reduction in specific GHG emissions from FY 2011-12 baseline.
- 1. Technological interventions and investment in R&D are fueling energy efficiency for core aluminium manufacturing. As a prime example, we have installed state-of-the-art AP36 technology in two of our new aluminium smelters. Further, our Utkal alumina refinery is one of the most energy efficient refinery globally. We are also focusing on technological upgradations to replace our existing fossil fuel consumption with alternative low carbon fuels. We have already replaced our oil-fired furnaces at Dahej, Hirakud and Aditya plants with natural gas-based furnaces.

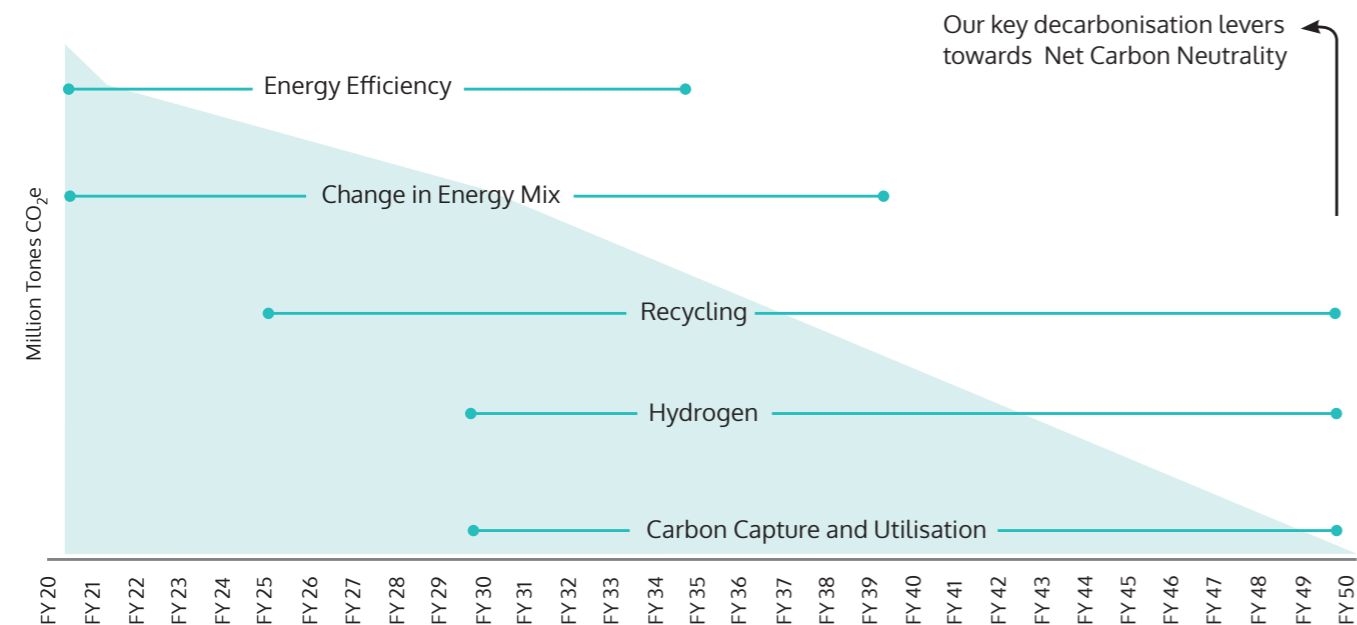
2. Energy efficiency enhancements of our existing facilities through Innovative projects at Smelters. For example, we have reduced energy consumption in Aluminium Smelter through phased implementation of copper insert collector bar, installation of clamp modification, cast iron sealing, step stub Anode, pot noise amongst others. Also, current efficiency improvements and pots life prediction through application of Digital Twin has been undertaken. During the year, total 319 pots were modified with copper insert collector bars at Aditya, Mahan & Hirakud Smelter. These energy conservation initiatives also result in significant cost savings. In FY 2021-22, we saved ₹ 1468 million through energy and carbon reduction activities.

- **Change in Energy Mix:** Installation of Renewable Energy Projects has also been our focus area for decarbonisation. We have installed solar power plants with a total

capacity of 100 MW across our facilities, which includes first Smelter in the country with 30 MW Solar Plant. Another 38 MW renewable projects under execution, which includes 20 MW Renewable hybrid, 9.5 MW Floating solar & 5 MW wind power. We also have another 50 MW renewable projects are under finalisation at various locations. Additionally, we have planned for the large scale renewable Hybrid with pump hydro storage project our Aditya location. We are committed to take the total renewable capacity of Hindalco to 300 MW by 2025.

In addition, there are certain projects which are currently in the viability stage such as large scale floating solar, renewable with energy storage mechanism and switch to low carbon fuel gas such as LNG. We've also looked into the possibility of adding more solar power, including rooftop and floating solar plants in future.

We have based our decarbonisation strategy to address above aspects which relies on following main levers:



# Strategy

- **Hydrogen and CCUS:** We are actively looking at new and emerging technologies for carbon capture in an economic way. In this regard, we will undertake a pilot project on carbon capture, utilisation, and storage (CCUS). At the same time, we are exploring utilisation options of captured carbon. We are also keeping a close watch on technological advancement for generation, transportation, storage & utilisation of green hydrogen. We have collaborated with Shell & other agencies to work on various aspects of decarbonisation.

To implement these initiatives in a systematic way, we regularly monitor our energy performance at all our operating units as well as corporate locations. Our top management's participation in these assessments aids us in making system enhancements and reducing our energy usage behaviors. A total of our six plants/locations are now ISO 50001 certified. We also conduct energy audits at our plants on a regular basis to keep track of our progress and identify opportunities for improvement. During this reporting period, we received several awards for our coordinated efforts at our various sites. At the Confederation of Indian Industry's 21<sup>st</sup> National Energy Award for Excellence in Energy Management 2020, we got the Excellent Energy Efficient Unit award for our smelting unit and power plant at Hirakud (CII). The Mission Energy Foundation, CII has given us the award for Best Energy Efficient Plant for Mahan in the power plant category in the western region. Mahan has also been declared as the Winner in large category in "Implementation of ISO 50001 Energy Management System" in 5<sup>th</sup> Edition CII National Energy Efficiency Circle Competition '21. In India Green Manufacturing Challenge (IGMC), Aditya has won Gold Medal and Special Award for Energy Conservation. In aluminium sector category, Renukoot has bagged the SEEM national Energy Management (SNEMA) Platinum Award 2020 by MoP.

## Focus on downstream value chain and use of recycled content:

Through our subsidiary Novelis, we have invested heavily in developing Aluminium recycling. We understand that producing of secondary aluminium is less energy intensive in comparison with primary aluminium production. Also, as aluminium is a highly recyclable metal, we intend to put focussed efforts in growing our capabilities for the same. Novelis is already leading the global aluminium recycling with 57% of its production coming from recycled Aluminium. Moreover, in line with our downstream strategy, we have already invested approximately \$2 billion since FY 2010-11 to grow total recycling capacity to approximately 2.5 MT. Our closed-loop Aluminium recycling system allows us to take back as much of our customer's scrap as possible, turning it back into the same product again, and thus supporting the circular economy principles.



## Putting a Price on Carbon

We, at Hindalco, understand the importance of minimising our carbon footprint and achieving our ambition of Net Carbon neutrality by 2050. To accelerate investments in this space, we have developed a structured internal carbon pricing (ICP) framework which will help us in associating a cost for each ton of CO<sub>2</sub>e emitted from our operations. We firmly believe that ICP is an effective tool for managing climate-related risks and opportunities. It helps businesses to prepare for potential future regulatory changes, including Emission Trading Schemes (ETS) or Carbon Tax (CT), and facilitates investment decisions related to low carbon growth initiatives.

The carbon price adopted by us has been calculated based on several discussions at different levels of the Company, ambition of Net Carbon Neutrality by 2050, and considering established and developing technologies and how their costs are going to change over the years.

As an outcome of this in-depth study and analysis, we have adopted a carbon price of \$31 for the period of 2021-2030, \$43 for a period of 2031-2040 and \$59 for a period of 2041-2050. We intend to implement this price for all return-based projects, i.e. wherever a cash inflow is possible, and calculate an IRR value to check for economic feasibility. We have a fast-track system for all Non-Return based Environmental and Safety projects, to ensure that these projects also get priority approvals and get implemented for their sustainability value, even though they are not bringing any financial returns.

Our framework also includes details of roles and responsibilities for all relevant stakeholders at various levels including Energy Manager, CAPEX Initiator, CAPEX Admin, Decision makers and Relevant Corporate Teams. The defined responsibilities help teams in effectively implementing the framework for capital

projects relevant to carbon emissions. We have also developed an internal audit mechanism to ensure the effective implementation of this framework.

We have developed a comprehensive tool for employees which provides the overall CAPEX incurred for Carbon abatement projects, total carbon abated, and carbon-based savings accrued. This tool helps us in understanding the relevant metrics such as IRR with carbon savings from taking more informed decision.

We are also convinced that integrating ICP in our investment decision making processes will have several advantages in expediting our Carbon Neutrality journey, as below:

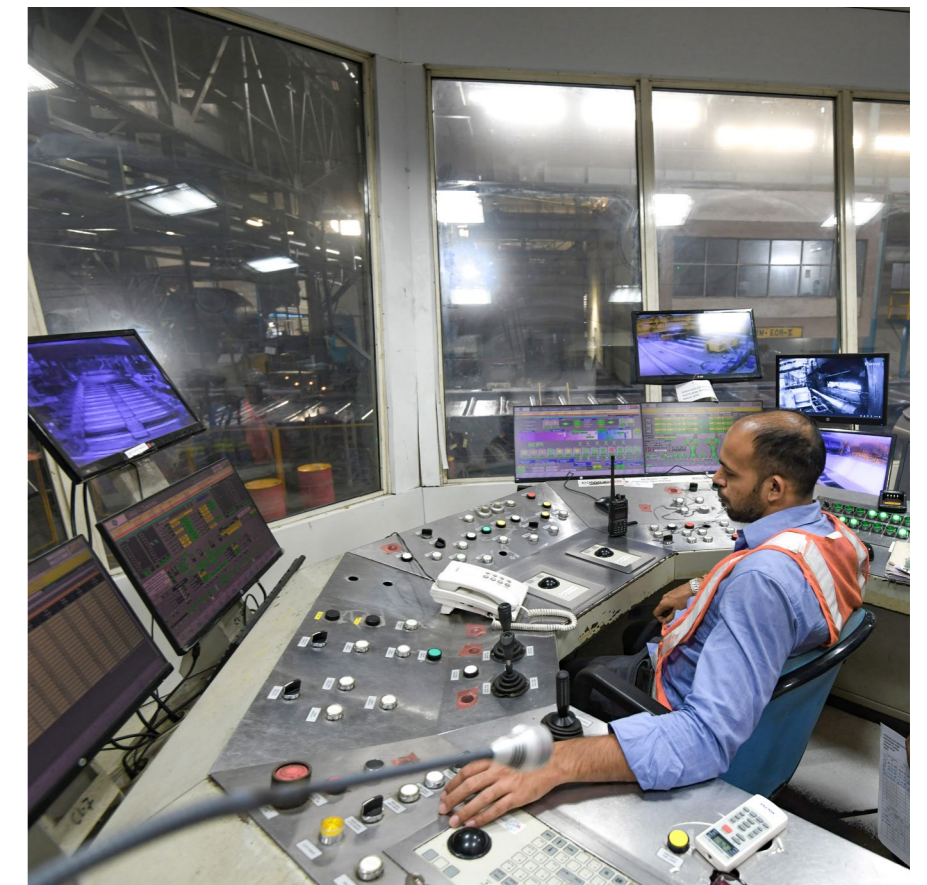
- For projects that have potential to reduce carbon emissions, such as Energy Efficiency, Fuel switching and Process Efficiency, incorporation of ICP in project return estimations will help us to factor the abatement as a cost saving across the lifetime.
- Due to this additional saving, the IRR for low carbon projects increases and it will encourage better decision making by the management, allowing more low carbon projects to be adopted
- The carbon pricing also taxes the projects which are leading to increase in emissions by adding a cost of carbon to them, which would bring our focus on reviewing the implementation decision for such projects and incorporating sustainability aspects from the design stage

We have already initiated utilising the ICP in our investment decision-making and have carved out several projects which will help in reducing our carbon emissions. Going forward, we intend to mainstream the use of ICP in carbon-related projects and accelerate our journey towards Carbon Neutrality.

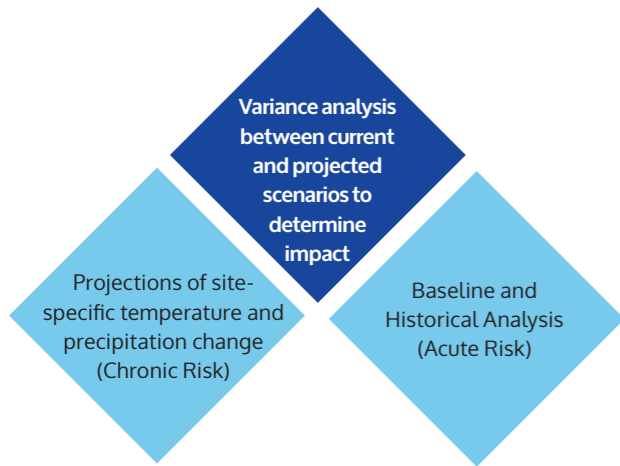
## Scenario Analysis and Results

Scenario analysis was conducted to enhance our resilience towards physical and transitional climate risks. Direct impacts of climate change are already being experienced all around the world. In the last few years itself, countries experienced ravages from wildfires, heatwaves, cyclones, floods, and heavy rainfall amongst other severe disasters. This not only increased the vulnerability of societal stability, but also had risks on employee well-being, operational facilities, and supply chain disruptions. Moreover, as the world is moving towards low carbon economy, mapping transition risks is also becoming increasingly important as they have a significant potential to impact business operations.

We have experienced physical risks (such as droughts, heatwaves, cyclones, and floods) and transitional risks (such as change in consumer preference, adapt to evolving climate-related regulations, and others) increasingly over recent years in our business. To manage such risks, we oversee the risks at corporate and site level by integrating the climate-related risk management in Enterprise Risk Management framework. We are also proactively taking measures such as covering all our plants with comprehensive insurance coverage (including damages against extreme weather events), developing emergency preparedness standard operating procedures, employee well-being procedures and developing an energy efficient product portfolio amongst other initiatives.



# Strategy



This year, we have conducted a comprehensive climate risk assessment. We started the identification of climate-related risks by conducting site specific baseline physical risk analysis and assessing historical weather events. It was then co-related with scenario-specific projections to understand variability in risks and their impact over short, medium, and long-term time horizons. Also, for transition risk, we have studied the potential impacts of changing climate change landscape over our operations by using International Energy Agency (IEA) and International Aluminium Institute (IAI) scenarios and assessed their potential impact.



“Our human resources are our most valuable and critical assets, and our HR strategy focuses on safeguarding our workforce and ensuring their well-being. We are cognisant of the increased impact of the ongoing climate change on people due to changing weather patterns and are constantly trying to measure and mitigate any impact of the same in and around our sites through regular health and environment monitoring backed with appropriate preventive and corrective actions. This is a clear area of focus and priority for us today across our operations”

- **Samik Basu, Chief Human Resources Officer**

## Transition Risks

To analyse the potential transition risks for the Company, we conducted a detailed assessment in line with IEA scenario and International Aluminium Institute (IAI) scenarios. We intend to follow these scenarios to meet the global climate change goals along with our target of Net Carbon Neutrality by 2050. We conducted an extensive study of these scenarios and projections along with considering our historic emissions and future projections by Business-As-Usual scenario.

A brief of these scenarios is given in the below table:

Scenarios	Brief Description
IEA NZE 2050	The Net Zero Emissions by 2050 Scenario (NZE) is a normative IEA scenario that shows a narrow but achievable pathway for the global energy sector to achieve net zero CO <sub>2</sub> emissions by 2050, with advanced economies reaching net zero emissions in advance of others. The is consistent with limiting the global temperature rise to 1.5°C without a temperature overshoot (with a 50% probability), in line with reductions assessed in the IPCC in its Special Report on Global Warming of 1.5°C.
IEA B2DS	The Beyond 2°C Scenario (B2DS) sets out a rapid decarbonisation pathway in line with international policy goals. In the B2DS, the energy sector reaches carbon neutrality by 2060 to limit future temperature increases to 1.75°C by 2100, the midpoint of the Paris Agreement’s ambition range.
IEA 2DS	The 2°C Scenario (2DS) sets out a rapid decarbonisation pathway in line with international policy goals. The 2°C Scenario (2DS) describes an energy system consistent with emissions trajectory that recent climate science research indicates would give an 80 per cent chance of limiting global temperature increase to 2°C.
IAI 1.5°C	The International Aluminium Institute (IAI) has modelled a 1.5 Degree Scenario to meet global climate goals. The modelling is based on IEA’s Net-Zero by 2050 scenario, combined with the IAI’s material flow analysis and future demand scenarios.

### The key assumptions we have considered during this study are

- Keeping primary aluminium constant at 1.23 Mn Tonnes and Downstream production increased from 0.3 Mn Tonnes to 0.9 Mn Tonnes by 2050.
- IAI pathway is followed till 2030, at which point the intensity is assumed to be 15 tCO<sub>2</sub>/T Aluminium, post which Net Zero transition happens as per IEA scenarios

As the conclusion of the risk assessment, we strongly believe that we have implemented adequate risk mitigation measures against transition risks. Some of the prime examples include adapting Internal Carbon Pricing mechanisms, consistently monitoring and progressing towards our commitments, developing energy efficient product portfolio, diversifying into new businesses, and implementing state-of-the-art technologies.



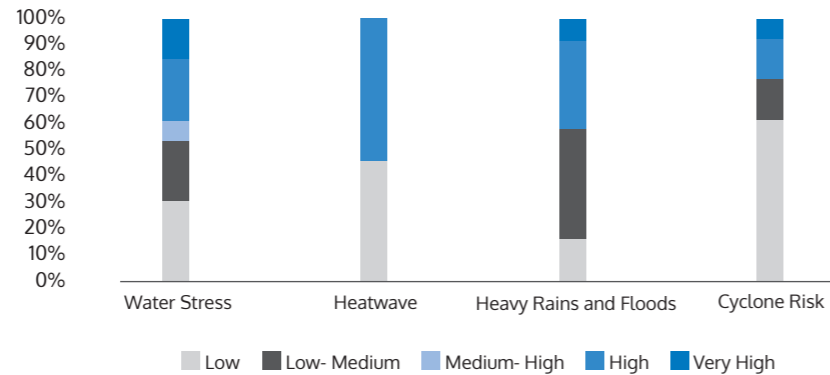
# Strategy

## Physical Risk - Acute Risks

We conducted baseline assessment of our sites by using various globally recognised tools and databases such as WRI's Aqueduct Water Risk Atlas, India Water Tool and ThinkHazard tool to assess potential baseline water stress, flood, and heatwave risks. We also used National Disaster Management Authority's data on cyclone prone districts of India to assess Cyclone risk at our plants. We also conducted detailed discussions with the teams across our plants to validate our analysis as per their on-ground experience of extreme weather events. This also helped us understand the effectiveness of our analysis, impact of acute risks and relevant measures adopted to mitigate the same.

The baseline water stress, heatwave, heavy rains and flood, and cyclone risk bifurcation of our sites is as below:

### Acute Risks (Baseline Assessment)



## Physical Risk - Chronic Risks

Our risk management approach does not stop at managing existing climate-related risks. It includes proactively understanding future possibilities to take informed business and financial decisions. We have performed scenario analysis, which is a well-established method for developing strategic

plans that are more flexible or robust to a range of plausible future states. To undertake a predictive scenario analysis for climate-related physical risks, we identified Intergovernmental Panel on Climate Change's (IPCC) global scenarios, i.e. Representative Concentration Pathways (RCPs) as per the Fifth Assessment Report (AR5). The following table shows the details

about the RCP scenarios, using which we projected physical risks and business implications for Hindalco.

These scenarios include a mitigation scenario leading to a very low forcing level (RCP 2.6), two medium stabilisation scenarios (RCP 4.5 and RCP 6.0) and one very high baseline emission scenario (RCP 8.5)

RCPs with Radiative forcing in 2100 (W/m <sup>2</sup> )	Global Emission Summary	Temperature anomaly (°C): Baseline considered (1850)	Rate of change in radiative forcing
RCP 2.6	The most ambitious approach is RCP 2.6, which limits the global warming up to 1.5°C, as per Paris Agreement goals. This scenario assumes active carbon dioxide removal from the atmosphere, resulting in emissions peak in early 2020s and then subsequently decline.	1.5	Declining
RCP 4.5	The IPCC describes RCP 4.5 as an intermediate scenario. This scenario assumes emissions peak in early 2040s and then subsequently decline.	2.4	Stabilising
RCP 6.0	This scenario assumes emissions peak in early 2060s and then subsequently decline.	3.0	Stabilising
RCP 8.5	Emissions continue to climb in RCP 8.5 throughout the twenty-first century. RCP8.5, which is commonly used to model worst-case climate change scenarios, was predicated on overestimation of anticipated coal production.	4.9	Rising

\* Radiative forcing, measured in Watts per square metre (W/m<sup>2</sup>), is the increased heat that the lower atmosphere will retain because of increasing greenhouse gases.

## Our Analysis and Results:

We studied site-specific temperature and precipitation variability to co-relate long-term changing patterns with baseline acute risks and historical weather events at our sites for all the above scenarios.

### The results for RCP 8.5 for year 2100 is shown below:

Site Name	Baseline Maximum Annual Temperature	Projected Change in Maximum Temperature	Baseline Average Monthly Precipitation	Projected Change in Precipitation
Aditya Aluminium		↑		↓
Alupuram		↑		↑
Belgavi		↑		↑
Belur		↑		↓
Dahej		↑		↓
Hirakud		↑		↓
Mahan		↑		↓
Mouda		↑		↓
Muri		↑		↓
Renukoot		↑		↓
Renusagar		↑		↓
Utkal Alumina		↑		↓

Expected Increase from Baseline	Maximum Annual Temperature	Expected Decrease from baseline	Average Monthly Precipitation
<36 °C	Lightest Yellow	< 77 mm	Lightest Teal
36-40 °C	Light Yellow	77-99 mm	Light Teal
> 40 °C	Dark Yellow	> 99 mm	Dark Teal



# Strategy

The maximum average temperature increase is projected to reach more than 50 degrees Celsius in 2080-2099 at select sites against the maximum of 40 degrees in the baseline. The maximum temperature is projected to be highest at Mahan, Aditya Aluminium and Hirakud. These climatic conditions may increase the heatwave risks at our sites.

We also studied maximum temperature variability monthly up to year 2100 and daily probability of heatwave up to year 2100 in the RCP scenarios. The temperature rise directly co-relates with the daily heatwave probability, which is projected to increase in the RCP scenarios.

We recognise the potential risks this could bring to our plants, and we have already taken proactive measures to mitigate the same. Along with the existing resilience measures implemented to tackle heatwaves, we are continually increasing employee well-being measures to minimise the

impact of high temperature at our sites. We also analysed the residual risk by understanding the identified risk and comparing it with the mitigation measures implemented. As a result, we concluded that the impact of these risks on our plants and employees shall be minimal.

Climate change is also affecting the annual precipitation patterns. Though the annual average precipitation decreases from baseline precipitation, an average increase over the years has been projected for most of our sites.

When we saw the change over the months, the drought risk is projected to increase during summers, and the flood or heavy rainfall risk is projected to increase in the monsoon. This signifies how climate change is inducing compound extreme weather events, i.e. consecutive droughts, heatwaves, and floods in Indian region. Alternative water sources, ZLD and rainwater harvesting is already done to increase drought

resilience of sites such as Dahej during the summers. For the flood prone sites, such as Alupuram and Belgavi, we have a comprehensive set of flood resilience measures which have been converted to systematic policies and procedures over the years. We have been foreseeing the upcoming impacts and are implementing relevant measures to minimise our residual risk.

Also, to make our plants more resilient to extreme weather events, we have taken plant-level targets on water consumption. Our plant at Dahej has taken an ambitious target of reducing 59.29% in GIDC seawater salination supply from FY 2018-19 baseline by FY 2024-25. There are several interventions implemented to reduce it and we are positive that the target will be achieved. Also, our Belagavi plant has taken a target to reduce freshwater consumption which is detailed in the case study given below.

## Employee Well-being Measures at Aditya Aluminium

### (Heatwave Risk)

Every year Sambalpur and few other districts of Odisha in India experience severe heat waves. It should be noted that in past Sambalpur has often been crowned as the hottest place in the State. During peak summers the temperature in Sambalpur district goes up to 45.2 degree Celsius which can have a huge risk to human life. The high temperatures can lead to risks such as sun stroke due to exposure to severe heat, increase in body temperature, possibility of heart stroke and dehydration, and exacerbation of preexisting chronic conditions (such as various respiratory, cerebral, and cardiovascular diseases and changes in blood flow and excessive sweating).

To reduce the residual risk of increasing heatwave exposure, Aditya Aluminium ensured that none of their employees are exposed to extreme heat. For the same, the site has internal

standards to avoid physical work with exposure to direct sunlight between 11 AM to 3 PM during peak summer days. A separate budget provision has been kept for providing essential items required in summer such as ORS Powder, Glucon D, Lemon water and Cold drinking water amongst others. Furthermore, regular awareness programmes are conducted to sensitise the employees and workers about risks, signs, and symptoms of heat stroke. In case of any health effects, the site ensures that Emergency Response Team is active and works round the clock to take care. Aditya's Health Centre is equipped with required medical infrastructure (Medicines, Infectible & machineries), along with connectivity to specialised district hospitals to take care of any critical cases. With these measures, even with high heatwave frequency, the residual risk to employee well-being has been minimal.

## Coal Procurement at Gare Palma Mines, Chhattisgarh

### (Heavy Rainfalls Risk)

Gare Palma Mines in Chhattisgarh are used for coal mining for Hindalco. The area has experienced heavy rainfall and lightning in past few years. In one such event, the damages led to supply chain disruption affecting the operations. Roads were blocked due to waterlogging and pothole formation; temporary accumulation of water in OB dump was observed; and coal dispatch was hampered due to connectivity issues. Further, the high moisture content affected quality of coal by reducing its Gross Calorific Value. Overall, working capital blockage had negative financial impact on our supply chain and operations.

We immediately took rectification measures and changes in SOPs to prevent the negative impacts going forward. Firstly, design changes were made around the mines to evacuate water from the mine area. All the water catchment areas, slopes, rain cut, drains, canals were inspected and cleared off from clogs and jams; and technological solutions like dump slope monitoring, real time water level assessment was adopted.

Secondly, a pre-monsoon ritual was formed after the event. Now, pre-monsoon discussions, inspections, and audits as per our monsoon preparation checklist starts at least 3 months before the onset of monsoon every year. We have constituted a cross functional team to carry out inspections and audits in a time-bound manner. Based on monsoon audits, rectification, drain cleaning and other preparatory measures are undertaken every year. We have also installed ready to run pumps in the dump area to remove the additional water in case of heavy rains. We have also increased our mock-drill frequency to increase our preparedness.

Thirdly, to ensure efficient logistics procurement, we now cover our raw material in tarpaulin to avoid physical damages. Alternate sources for supply of raw material are identified and kept ready to ensure continuity in supply in case of unforeseen circumstances. We also increase the raw material stocks pre-monsoon to ensure material availability.

Lastly, to ensure employee safety and well-being, we now ensure 24\*7 availability of Fire Tender & Ambulance with a ready Rescue & First-Aid team.

## Reduction in Freshwater Consumption at Belagavi

### (Drought Risk)

Our Belagavi site falls under the special case of experiencing compound weather events. It faces high flood and cyclone risks in monsoon, while it has also been declared one of the 24 eternally drought prone districts in India by National Rainfed Area Authority in 2019. We took the following steps to reduce the dependency on freshwater and increase our drought resilience in summer.

The refinery unit at Belagavi relied solely on the water supply from the corporation to meet its overall water requirements. This water source in turn depends entirely on the rains in the catchment area. The average freshwater consumption at the unit was in the range of 110 ML per month. In the absence of water supply, refinery operations were impacted. Moreover, the unit also anticipated a rise in the existing price of water in future.

Moreover, to bolster our focus on reducing freshwater consumption at Belagavi plant, we took an ambitious plant-level target. The plant aimed at reducing freshwater consumption by 43.88% from FY 2018-19 baseline by FY 2024-25. To achieve the target and reduce its freshwater consumption, a dedicated team at the unit implemented an innovative project to send the recycled and treated effluent back into the refinery process after treatment through ETP, thereby promoting Zero Liquid Discharge.

Furthermore, a dedicated lined treated water storage pond of 6,000 m3 volume was constructed along with pumping facility. Also, a dedicated freshwater line was installed to meet the freshwater requirement of filter press. This resulted in a reduction of freshwater intake by approximately 40%, bringing it down to 60-65 ML per month, resulting in a corresponding cost saving of ₹ 2.4 Crore per annum. These initiatives helped the plant achieve the target in FY 2021-22 itself, three years before the target year.

# Strategy

Our overall experience with these events and our responses were studied in detail to strengthen our risk management

	Significance of the issue	Resilience Measures			
<b>Operational Resilience in Extreme Weather Events</b>	Weather events like heavy rainfall, cyclones, droughts have high potential to impact operations. Historically, we have experienced impacts such as water logging, transport disruption, machinery damage due to floods, and water shortage from mainstream freshwater sources due to continual temperature increase and droughts. We are taking the below mentioned resilience measures to minimise the operational impacts due to weather events.	Effluent water is treated and used for auxiliary requirements to meet the overall water demands.	●		
		Zero Liquid Discharge (ZLD) mechanisms have been installed at various sites to further reduce dependency on freshwater consumption.	●		
		Alternate sources of water supply are being developed.	●		
		Water harvesting projects are undertaken. Ponds are constructed to collect rainwater and majority of the water requirement at mines is fulfilled through this harvested rainwater.	●		
		Storm Water Drains are upgraded to cater to torrential rains. They are separated from Effluent drains to optimise treatment system loads and treatment costs.	● ●		
		Watershed management measures are integrated inside our plant boundaries as well as in nearby villages. This includes developing structures such as rooftop collection systems, bunds, gully plugs, contours, terraces and rainwater harvesting ponds.	● ●		
		Monsoon preparedness plans are developed with emergency response plan, safety management plan and inspection checklists are prepared, which are further updated through continual reviews and mock drills. This helps to ensure resilience against possibilities of water blockage in the plant area which may damage costly machinery and electrical equipment.	●		
		Data is analysed as per premier weather forecasting agencies to assess/estimate the threat period and daily weather forecasts are monitored.	● ●		
		<b>Employee Well-being in Extreme Weather Events</b>	Employees are our most important assets, who form the foundation for the working of our businesses. Weather events can possess safety hazards to human capital and hamper their safety. We put our first and foremost focus to ensure that our infrastructure and employee well-being measures are robust to ensure high quality safety standards.	Waterproofing of all buildings' roofs are done before monsoon to ensure employee safety.	● ●
				Flexible working hours are provided for physical work to avoid direct sunlight in hot summer period.	●
Sensitisation programmes are conducted to aware employees of well-being risks.	●				
A separate budget is kept for providing cold drinks to employees in summer to lower down the body temperatures.	●				
Statutory welfare provisions are available for workers such as Rest Shed and Water coolers.	●				
Health care facilities are present for employee well-being. Check-ups and required tests as per Occupational Health guidelines are conducted periodically.	●				

● Heavy Rainfall and Flood ● Drought ● Heatwave ● Cyclone

Significance of the issue	Significance of the issue	Resilience Measures	
Supply chain disruptions can affect timely availability and cost of essential raw materials for aluminium and copper manufacturing. Transport routes disruption and mines water logging have been observed in past. However, our prompt responses (mentioned below) and continual updating of standard operational procedures have prepared a sustainable and efficient supply chain for futuristic events also.		Key raw materials are sourced through flexible logistics network of alternative & geographically spread-out suppliers.	● ●
		Buffer stocks are built at our mines, sidings, power plants and refineries before the peak of wet season. Also, back-up supply plan is created to get raw materials from captive mines.	●
		Key raw materials are covered with tarpaulin during heavy rainfall season to avoid any damage.	●
		Data is analysed as per premier weather forecasting agencies to assess/estimate the threat period and daily weather forecasts are monitored.	● ●
		Monsoon preparedness plans are developed with emergency response plan, safety management plan and inspection checklists are prepared, which are further updated through continual reviews and sensitised through mock drills.	●
		Pre-monsoon audits, inspections and observations are conducted on weekly basis during monsoon.	●
		Design changes such as developing garland drains around mines for water evacuation, upgrading tunnel and hill designs of supply routes, monitoring dump slopes and adding ready to use pumps in mine areas amongst other are also done to build resilience.	● ●

● Heavy Rainfall and Flood ● Drought ● Heatwave ● Cyclone

## Catalyst for National Decarbonisation

At Hindalco, we believe not only in decarbonising our operations, but also to act as a pioneer of the national decarbonisation journey. In this section we have covered our approach on tapping into relevant climate-related opportunities along with its impact.

India is moving towards a cleaner economy, and we are proud to support the nation in its decarbonisation journey. At Conference of Parties 26 (COP26), India pledged to reduce its emissions by 1 billion tonnes by 2030, reduce the carbon intensity of its economy by 45% by the end of the decade, and

achieve net-zero carbon emissions by 2070. These promises will hasten the adoption of renewable energy, clean manufacturing, and increased low-carbon product and technology innovation.

“At Hindalco, our purpose drives us act responsibly and reduce our environmental footprint. But that is just the first step; we are even more focused on co-creating value added products and solutions that are both planet positive and deliver superior performance and profitability for our customers. This report articulates our willingness to emerge as a catalyst for a greener, smarter, stronger world”

– Nilesh Koul, Head, Downstream business

# Strategy

Aluminium facilitates energy and CO<sub>2</sub> savings in many sectors. For example it is used to produce solar panels, energy storage devices, wind turbines, lightweight vehicles, energy-efficient buildings, and transmission cables for the transfer of renewable electricity, and many others.

We are also focusing on developing products that have substantial CO<sub>2</sub> reduction potential in transportation sector. We have introduced all Aluminium bulker which promotes greater fuel efficiency with respect to conventional bulkers and has longer lifetime. We have also launched India's first all-aluminium freight trailer which is around 50% lighter, saves considerable fuel consumption and has 70% higher scrap value. Use of aluminium in EVs has reduced the weight of the vehicle by 5-10%, and hence has resulted in energy reduction in use phase over its lifetime.

In railways, the application of allaluminium railway wagon has reduced the wagon weight by ~40% in total, making it more energy efficient. More details on it can be found in the 'Our Climate-related Opportunities' section.

## Catalyst @ Lightweight mobility:

**Aluminium for Light-weighting and usage in Electric Vehicles:** Annual emissions from India's transportation industry account for a significant portion of the country's total emissions, owing to constantly increasing passenger and freight traffic. However, electric vehicles usage is increasingly being adopted in India due to its contribution towards low-carbon economy. The government has also taken several steps in this domain, including investments of US\$ 1.4 billion to make India a centre for electric vehicles. With the government's ongoing push and stakeholder demand, India is expected to become the fourth-largest market for electric vehicles by 2040. The development of electric

vehicles would rely heavily on the use of lighter metals such as aluminium to reduce vehicle weight.

Light-weighting describes the process of making lighter automobiles and trucks in order to improve fuel efficiency, range and handling. The strategy's basic premise is that it takes less energy to accelerate a lighter item than it does for a heavy one, hence lightweight materials have a lot of promise for improving vehicle efficiency. Aluminium is known for its versatility, encompassing its light weight, anti-corrosivity, longer lifespan, and energy efficiency. Cast iron and conventional steel components can be substituted with aluminium to lower the weight of the vehicle and hence reduction in its fuel consumption. To tap into this opportunity, we have already partnered with Railways and Original Equipment Manufacturers (OEMs) for developing light-weighting of bulkers, trailers, buses, railway rakes and electric vehicles.

In December 2019, we introduced India's first full aluminium freight trailer. For India's logistics and freight business, the trailer is expected to bring a positive difference. The trailer is 34 feet long, weighs about 2.5 tonnes less than an identical steel trailer and is 50% lighter. Also, the trailer is safe, sturdy, durable, efficient, and environmentally friendly due to the usage of high-strength Aluminium alloy. Each trailer saves approximately 15,000 litres of gasoline and emits 25 tonnes less GHGs during its use phase, assisting in the achievement of BS-VI emission goals. It also contributes to a 70% increase in scrap value.

As another example, we substituted steel with aluminium in the production process, resulting in an 1,800 kg weight reduction and thereby increased fuel efficiency while lowering GHG emissions. An Mild steel bulker of the same size is around two tonnes lighter

than a 30 cubic metre bulker. Improved fuel economy saves ₹ 50,000 per year in addition to lowering GHG emissions every tonne of material carried.

Our aluminium bus also helps reduce energy consumption by conserving fuel and lowering greenhouse gas emissions.

**Improving EV battery range and efficiency:** Battery cost, capacity, efficiency and charging speed are important considerations to determine scalability of electric vehicles. Reduction in battery size can increase the battery range, i.e. the distance an electric or hybrid vehicle can travel before the battery needs to be recharged.

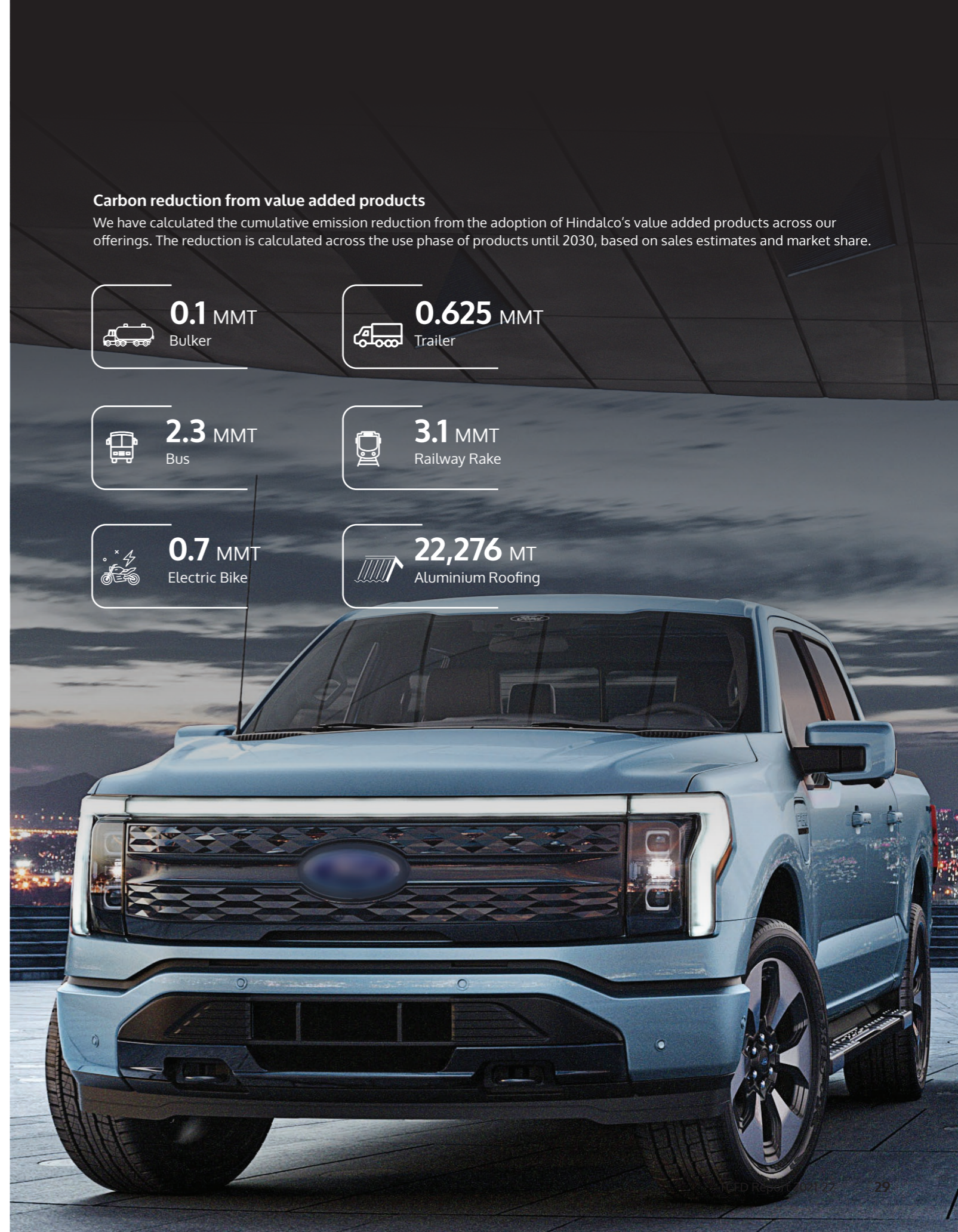
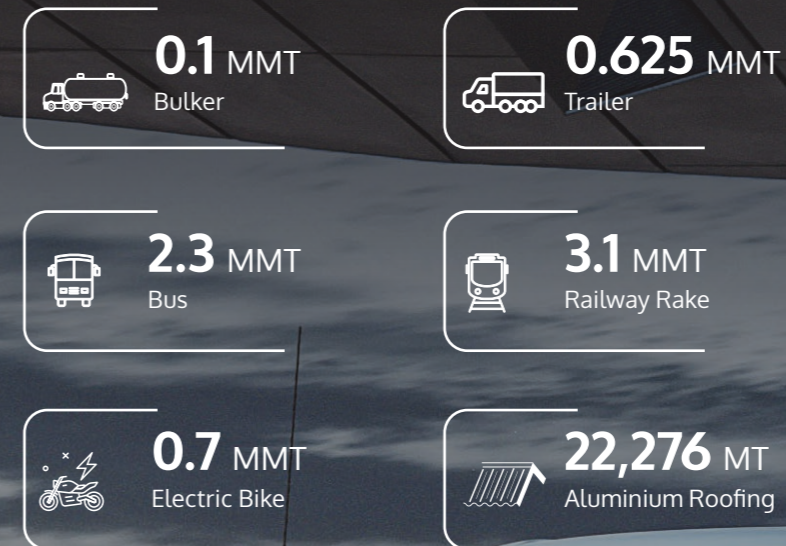
With the usage of aluminium, we are assisting several EV manufacturers in reducing battery size and thereby increasing the vehicle range (in kilometres). We are also assisting companies in improving the efficiency of Li-ion batteries and providing battery chemistry improvements.

### Aluminium Sheet Battery Enclosure

At Hindalco, we place great emphasis on developing innovative products and solutions. As one of the prime examples, Novelis has developed the world's first aluminium sheet battery enclosure, which is 50% lighter than a steel version and increases single-charge range by 6-10%, allowing cars to run longer. It may be customised to fit a variety of complicated geometries for unique vehicle design needs while also protecting the batteries from road debris and vehicular collisions.

## Carbon reduction from value added products

We have calculated the cumulative emission reduction from the adoption of Hindalco's value added products across our offerings. The reduction is calculated across the use phase of products until 2030, based on sales estimates and market share.







### Catalyst @ FMCG industry:

**Aluminium for substituting plastic in beverage packaging:** Plastic pollution is a growing worldwide issue. Every year, the planet creates around 380 MT of plastic that could end up as contaminants in our native habitat and seas. Here, packaging is the most common application for primary plastics, accounting for 42 percent of all plastics used. Beverages have been packed in plastic bottles for ages, which has resulted in increased disposal in sea, leading to death of life under water. Even when plastic bottles are collected back, they are not necessarily recycled.

Here, aluminium can play a crucial role in replacing plastic for beverage packaging. The recycling of aluminium is a closed loop system. It is one of the most recyclable commodities on the market, according to the International Aluminium Institute. As per a study from Metal Packaging Europe, aluminium beverage packaging cans can reduce 31% emissions on an average for different can sizes. We are focusing on

leveraging this opportunity through innovations in beverage packaging.

### Catalyst @ Construction industry:

**Aluminium for thermal insulation in construction:** Globally, commercial and residential buildings account for energy use and greenhouse gas emissions. This majorly constitutes the building's heating or cooling energy requirement where aluminium usage can play a substantial role. We have conducted an internal study to understand the impact on a room's energy usage by utilising aluminium for roofing and cladding (process of coating a material over another). The study concluded that using aluminium can reduce carbon emissions over stainless steel. It could therefore be used in buildings to offer thermal insulation, and thus, to keep them comparatively cooler. Apart from this, the long life of aluminium products makes it more sustainable and cost efficient to use in long-term. We have already partnered with companies to provide aluminium for cladding, and thus catalysing the efficient energy usage in buildings.



# Risk Management

The risk management section covers how the Company identifies, assesses, manages, and monitors potential risks, including climate-related risks. It also provides information to how the climate-related risks are integrated within the firm-wide risk management framework supported by robust risk governance.

## Alignment with TCFD Recommendations – Risk Management

Describe the organisation's processes for identifying and assessing climate-related risks.

Describe the organisation's processes for managing climate-related risks.

Describe how processes for identifying, assessing, and managing climate-related risks are integrated into the organisation's overall risk management.

We are driven by the principle of being 'Predictive, Proactive and Prepared'. This entails developing an efficient process to proactively manage risks and crisis situations while ensuring business continuity. Our Risk Management framework imparts a systematic and consistent approach to identify opportunities and threats by managing the associated risks in efficient ways. We have designed it to make the Company more resilient and dynamic to potential risks. Our risk management also focuses on identifying, assessing

and managing climate-related risks and is completely integrated in our Enterprise Risk Management framework.

As our operations cover end-to-end value chain of metals and mining industry, we encounter a host of risks, driven by price volatility, regulatory changes, availability of natural resources, sustainability, community, and so on. Hence, we have set-up a robust risk governance and management procedures to ensure that risks are appropriately mitigated.



"Decarbonisation has been identified as the top risk by the comprehensive Risk Management framework of Hindalco and we have responded by adding it to our list of strategic priorities. To minimise the climate related risk impacts to our workforce, operations and communities, we have devised a long-term strategy with short-term targets and objectives. We have identified risks specific to ESG, with KPIs and targets on each of E, S and G, and the KRAs of the management being derived top-down based on them driven by the Risk management and ESG committee of the board at the helm to overlook at the strategy of sustainability for Hindalco."

– Anil Mathew, Chief Risk Officer

## Risk Governance

We strongly believe in having a clear board looking out for potential risks faced by the Company and hence our Board-level Risk Management and ESG Committee oversees the same. The committee is updated quarterly by senior leadership on the potential risks, including climate-related risks, and relevant mitigation measures to be taken for the same. The committee also provides guidance for further enhancing the Company's resilience.

The senior leadership is also charged with identifying, mitigating, and managing risks across the organisation. Chief Risk Officer (CRO) is primarily accountable for enterprise risk management and drives the risk management framework at the Company. Also, implementation of risk management processes and ensuring compliance to risk procedures are part of the KRA of each member of senior leadership. The biggest risk of safety and environment, including climate-related risks, also forms a crucial part of the senior leadership's KRAs and hence, their variable compensation is linked to the performance of these objectives. The variable compensation is calculated in alignment with business performance, which includes the

sustainability progress as well. More details of sustainability-related targets aligned with key personnel is given in Governance section of this report.

Moreover, we have dedicated teams at cluster-level, department-level and site-level to ensure that the relevant mitigation measures are implemented at all levels. Moreover, Monthly Business Review (MBR) and Quarterly Business Review (QBR), presented to Business Review Committee (BRC) to ensure that timely actions are taken for identified risks. These discussions and reviews also include discussions on risks specific to each business line, including climate-related risks. More information on risk governance and reporting lines, is provided in Governance section of this report as well.

## Risk Culture and Training

It is important for us to identify, assess and then find solutions to mitigate risks, threats or any unfortunate event in our operations that can affect our organisation in any way. For ensuring an effective risk culture, we have three dedicated trainings related to enterprise risk management, provided to our employees. First training is during the induction by central Enterprise Risk Management (ERM) team to our unit

risk committee involving department heads, senior management and other relevant key personnel. The second training is conducted once every year for all our employees to keep them updated on the developments and keep them abreast with key risks of the Company. The third training is a risk module which is conducted during onboarding of new employees.

We have also started conducting a refresher course on Risk Management for all employees across all our sites to build a strong culture of risk management across operational aspects. Risk champions have been identified from each site and each function, who are provided special training for two days on Risk Management concepts including identification, assessment, and management, risk tools, templates etc. We have trained and reinforced all our employees, new hires on the cultural beliefs of the Company, which are fundamental and integrated into all our HR systems. We also conduct Workshops, Seminars, E-trainings, etc to build risk awareness and understanding in our employees. These workshops and seminars also include sharing knowledge of climate-related risks and taking relevant mitigation measures.

## "Say Anything" Initiative

### Novelis

We strive to create an effective risk culture where our employees could raise their concerns on any expected risk. For the same, our subsidiary Novelis has a unique initiative named "Say Anything". This helps in equipping the employees across the organisation on how to voice concerns about activities and decisions that present risk to the Company. 'Say Anything' specifically enables employees across all levels to speak up and feel empowered to prevent risks they identify. We also have Ethics Hotline toll-free option in all available languages through third-party vendor to offer a way for employees to report observations.

# Risk Management

## Our Risk Management Procedure

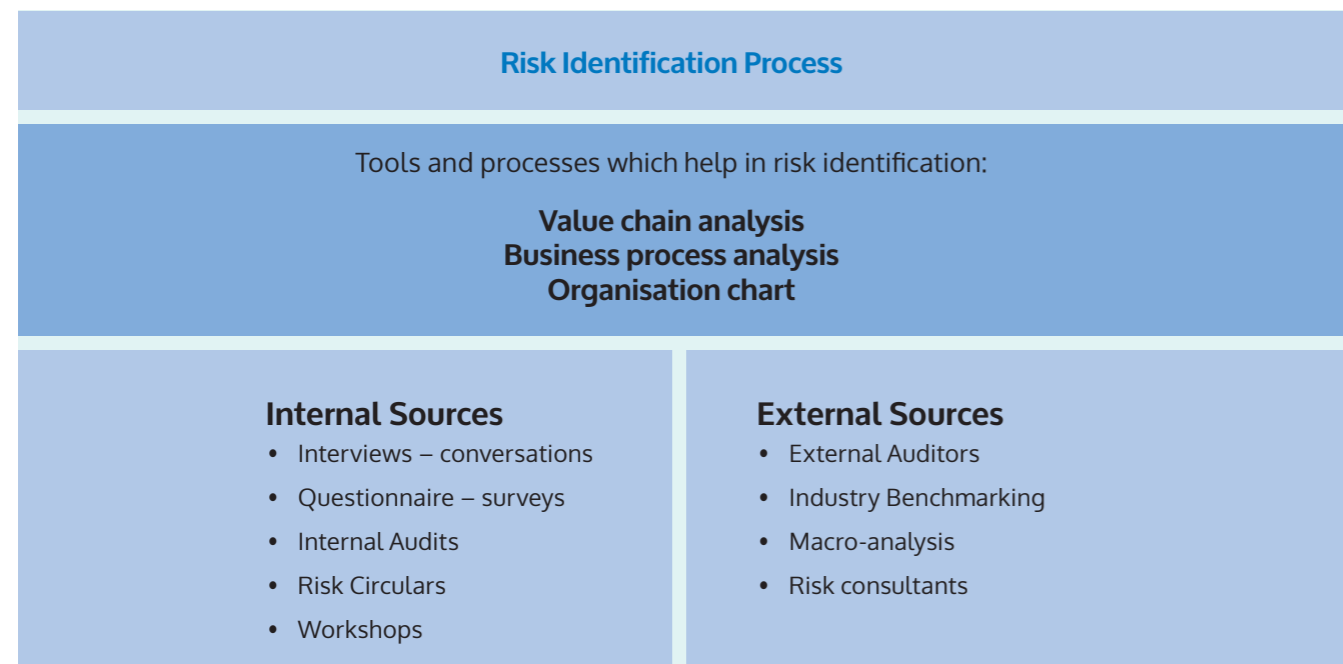
Our Risk Management Framework considers the identified environmental vulnerabilities related to climate change, water availability, land degradation, land availability and extreme weather events. We have formulated plans to minimise our impact on the environment and

mitigate environmental and climate change related risks. By effectively utilising our procedure, we ensure that potential risks, including climate-related risks are proactively managed and integrated in our Enterprise Risk Management Framework.

As a part of our framework, we have developed a comprehensive risk management procedure, which is based on three major steps, i.e. Risk Identification and Assessment, Risk Management and Mitigation, and Risk Monitoring and Reporting. Details of each step is provided below.

### 1. Risk Identification and Assessment

The first step is to identify and assess potential risks for the Company. The process of risk identification covers internal and external sources of uncertainties which are identified using various tools and processes like value chain analysis, business process analysis and interactions like questionnaires, interviews, workshops, and other mechanism. The details of the same is given below.



All identified risks are added to the Risk Register at each department and one consolidated plant-level Risk Register is formed from all the department level ones. Risk Register is the document, which is used to enlist all the Risks identified at all levels. The Register will contain Risk Event, their classification, Risk Description, Causes-Consequences, Risk Rating, Existing Controls, additional mitigation (if required) and Key Risk Indicators. These all fields capture the Likelihood and Severity of that Risk Event (and Risk Bucket). Each of the

existing controls and additional mitigation plans are mapped to a Risk Owner and a definite timeline. To ensure its effectiveness, both these aspects are also audited regularly by the Risk Committee. Also, once the risk identification process is done, it is reviewed and updated every year to remain up-to-date with the relevant risks.

Once risks are identified, they need to be assessed to understand their priority for the Company. Any risks identified, almost by default, have some probability

of influencing the organisation. Risk assessment is conducted on two parameters - *Likelihood and Consequence*. With help of these parameters, the *Risk Impact (or likely impact)* is calculated and finally risks are assessed on a Net basis (after considering benefits of existing controls) and Residual basis (as per perceived benefits of proposed controls).

Risk Matrix	Likelihood	Rare	Unlikely	Possible	Likely	Very Likely	Expected
Impact	#	1	2	3	4	5	6
Disastrous	6	6	12	18	24	30	36
Severe	5	5	10	15	20	25	30
Major	4	4	8	12	16	20	24
Moderate	3	3	6	9	12	15	18
Minor	2	2	4	6	8	10	12
Insignificant	1	1	2	3	4	5	6

Risk Rating Score (Impact* Likelihood)		
Low	Zone 1	<=6
Medium	Zone 2	< 16 and > 6
High	Zone 3	< 20 and > 16
Critical	Zone 4	>=20

The ERM team has also developed a 6\*6 Risk Grid to measure and report exposure of each risk (image given below). Lowest level of impact is 1 (Likelihood: Rare; Consequence: Incidental) whereas Highest level of impact is 36 (Likelihood: Expected; Consequence: Extreme). The risk impact level is graded in four zones, which provides a perspective and enables comparison between different risk exposures and facilitates prioritisation.



# Risk Management



FY 2020-21, we had a total renewable capacity of 49 MW and by FY 2021-22 end, we have taken it to a total of 100 MW of RE capacity. Also, we will start utilising other less carbon intensive fuels such as Natural Gas for the power plant operations at Odisha. Moreover, there is also a constant focus on projects such as carbon capture mechanisms, energy storage devices, and others to reduce our overall carbon footprint. Furthermore, we have calculated the internal carbon price and intend to implement it across our Company to accelerate investment in decarbonisation technologies and mitigate the risk.

## b) Depletion of natural resources / Water non-availability

**Description** – We are highly dependent on natural resources such as coal, bauxite, copper concentrate, water, and others due to nature of our operations. It is of paramount importance to us to secure new reserves and enhance existing ones. Failing to do so would have a detrimental impact on our prospects. Also, uncertainty involved in obtaining natural resources from Government policy standpoint, global supply and demand forces, as well as some other factors play a vital role in the same.

**Mitigation Plan** – To mitigate this risk, we have implemented several plans which includes testing of existing bauxite and coal reserves for longer time period (more than a decade), acquiring coal mines to reduce the exposure to buying coal and others. Also, to ensure that risk of water non-availability doesn't hinder our operations, we have taken several initiatives for water recycling and rainwater harvesting across various plants. We also aim to achieve Zero Liquid Discharge and water positivity across mining and downstream verticals by 2025. Hence, by reducing our dependency on natural resources across the Company, we intend to minimise this risk.

decarbonisation, using coal possesses a potential risk to us. Also, the introduction of carbon tax in European Union and US will further accelerate it and impact the demand for Hindalco metal. This could also lead to increase in expense for selling our products into those countries.

**Mitigation Plan** – We are constantly looking at utilising renewable energy in our operations but using it for smelting has its own challenges in terms of reliability and storage, so replacing coal utilisation in smelters is practically not feasible at this stage. Nevertheless, there have been increasing efforts in investing in solar projects to run other operations (apart from smelting) and in domestic purposes such as energy usage in townships. At the end of

Identifying and assessing climate-related risks also forms an integral part of our process. We have observed several climate-related risks in recent risk identification process including decarbonisation, water non-availability, extreme weather events, reputational risk, and others. The details of some identified climate-related risks along with its description and mitigation plan are given below.

## a) Increased focus on Decarbonisation

**Description** – All our smelters have coal fired captive/co-generation power plants which leads to increase in carbon footprint of the Company. As there is increasing awareness and focus by stakeholders on

## c) Changes in rules & regulations

**Description** – For one of our core business, i.e. Aluminium, bauxite and coal are the key inputs and their mining and ownership are controlled by government regulations. Hence, frequent changes in rules and regulations is a potential risk which can affect cost and availability. Also, changing global regulations on product carbon footprint such as London Metal Exchange passport, Carbon Border Adjust Mechanism, others also have a potential to impact our business and products.

**Mitigation Plan** – As a mitigation measure, we continuously engage with Government agencies and conduct policy advocacy at various levels to ensure that we are aligned with changing regulations. Also, we actively participate in industry associations, such as International Aluminium Institute, to represent the benefits of Aluminium/Copper to potential and existing customers. Hence, through our proactive engagement practices with regulatory authorities, we anticipate and prepare for such changes. Moreover, to further mitigate the risk, we constantly monitor our compliance with relevant laws and regulations, including environmental regulations, and have systems in place to drive compliance across the organisation.

This year, we also have conducted detailed climate-related scenario analysis to identify relevant climate-related physical and transition risks for the Company. Details of the same are provided in Strategy section of this report.

## 2. Risk Management and Mitigation

Risk management and mitigation is the second step in the procedure. Once the risks are prioritised as per their likely impact, we perform various analysis such as threat analysis, failure mode and effects analysis, regression analysis, and others. The outcome of our analysis helps us in developing a mitigation strategy, keeping in mind the short-term and long-term implications of the risks on the organisation. These are incorporated in our governance and business strategy to achieve success in our overall business performance.

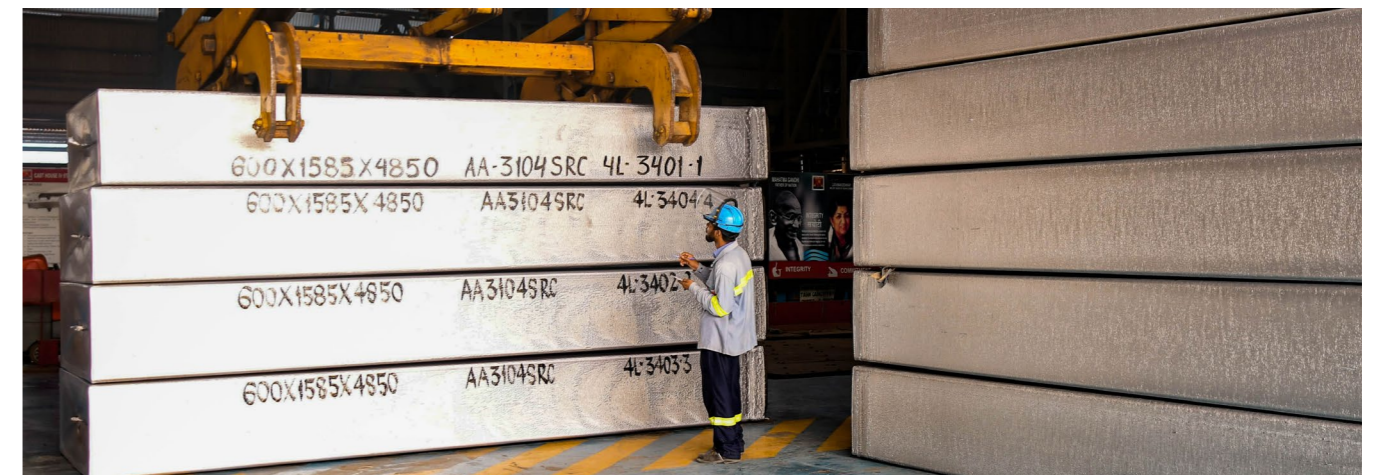
The mitigation measures or our response to risks include risk avoidance, reduction, sharing, and acceptance of risks. In considering its response, the management assesses the effect on risk likelihood and impact, as well as costs and benefits, selecting a response that brings residual risk within desired risk tolerances.

Mitigation measures aim to reduce either likelihood of a risk event occurring or limits its possible impact when it occurs; most often it works on both of these aspects. Due to beneficial effects of mitigation efforts, Net Risk level reduces to Residual risk level (which can be within desired level of exposure; or can be a step in that direction).

All mitigation measures and plans are time-bound, specific and feasible, and are assigned to individuals/teams unambiguously.

Once the Mitigation Plans are finalised, all relevant steps/ controls are incorporated in relevant plant Standard Operating Procedure (SOP). Risk Mitigation Progress & closure are checked in the IMS Audits done for the SOPs. Also, a proper reference of the Risk Register item number is provided in the SOP for further reference.

We also emphasise on managing our climate-related risks and for the same, we have developed effective mitigation steps to be taken for reducing their impact. Our response and mitigation measures, taken for relevant physical and transition risks, are detailed in the Strategy section of this report.



# Risk Management

## 3. Risk Monitoring and Reporting

We consider monitoring and reviewing to be the key factors in continual improvement and sustenance of the risk management procedure. We have developed a detailed risk monitoring framework at various level across the organisation. The bottom-up approach of regular risk meetings helps us remain updated with various risks faced by us and take appropriate actions. Details of meetings at each level of the risk hierarchy are provided below:

### 1. Department Level Meetings:

These meetings are headed by the Department Head and are attended by relevant employees of the department. Top Risks in the departments are discussed along with Mitigation plans progress.

### 2. Plant Level Meetings:

These meetings are conducted by Plant Risk Committees every month including the Plant Heads & Risk Champions. The agenda of these meetings is to discuss the top risk / department in each meeting and ensuring resource & time allocation. The consolidated Plant Risk Register are also reviewed, whenever required during these meetings.

**3. Corporate ERM Team Meetings:** These meetings are headed by Central ERM Team every month, reviewing Risk Management efforts at all locations and Corporate Functions. Major risks are discussed and, if required, added to the Risk Register for review senior leadership.

**4. Central Risk Committee/ Ex-Com Meetings:** A major part of Ex-Com is the Risk Committee, which deliberates on the Risk Register. In every meeting, one Location/ Function presents their progress as well.

Apart from the above-mentioned meetings, Cluster Level meetings are conducted every quarter and Risk Progress is also presented to the Board of Directors every quarter.

As part of the product development process, criteria around risk management are incorporated during every stage of the process. This includes a detailed exercise to map common and latent risks, assess their impact on project schedule, costs, manpower and resource requirements, to

monitor the relevant risks. We also continuously assess the exposure of our facilities to climate change related impacts.

We strive towards transparently reporting our risks and how we are tackling the same. In our annual disclosures, Risk Management along with potential risks are described in detail along with recent developments.

## Challenges in achieving Carbon neutral

Becoming Net Carbon Neutral in an energy intensive industry such as aluminium and copper production poses a big challenge. This becomes even more challenging for certain geographies like India where the grid electricity itself is majorly comprised of coal power. Aluminium smelting requires large amounts of continuous power supply and hence our primary aluminium production is dependent on coal-powered plants. Presently, there is no viable alternative to coal for Indian aluminium manufacturers, but we are consistently running pilot programmes to find innovative solutions for the same.

Furthermore, we have enhanced our downstream businesses, which emit only a fraction of GHG emissions than what our upstream businesses do. We are committed to not increasing our coal-based assets, but rather are planning to switch some of them to cleaner fuels like biomass and Gas. Also, removing 26 Mn Tonnes of carbon from our system will have its own challenges and we intend to partner with value chain partners to achieve the same.

We have seen a global drive in terms of technology development, combined with regulatory policies to support the uptake of such technologies. We are indeed betting on a breakthrough - be it availability of cheaper and greener hydrogen, improved CCUS, battery storage technology development etc., as well as government policies to support decarbonisation for aluminium sector. We strongly believe that with

recent developments happening in the decarbonisation space along with our proactive measures, Carbon Neutrality looks the achievable to us.

## Our Risk Resilience towards Climate Change

We, at Hindalco, always aspire to remain updated with relevant risks with our robust risk management framework. The framework also takes care of climate change related risks and senior leadership also proactively takes steps towards enhancing risk resilience of the Company.

Climate-related risks are also integrated in overall ERM framework of the Company, Hence, appropriate measures for both physical and transition risks are timely undertaken. For physical risks, we have taken proactive measures across plants,

like installing storm drainages in case of flood prone areas, SOPs for heatwaves, comprehensive water management plans, insurance for cyclone-related damages among others. Similarly, for transition risks, we have developed detailed roadmaps for climate-related targets, less emission-intensive product portfolio, regular monitoring of environmental compliance & legal requirements among others. More details on our steps for each climate-related risk are provided in Strategy section of this report.

We frequently visit and update our risk management framework, whenever required, and remain resilient against upcoming risks, including climate-related risks. This helps us in business continuity, minimising loss, tapping into opportunities, and providing consistent value to our stakeholders.



# Metrics and Targets

The disclosure on Metrics and Targets provides information on how the Company is progressing towards climate-related indicators. These include measuring and disclosing progress for the commitments or ambitions taken for managing and mitigating the impact of climate-related risks. We are consistently disclosing our metrics, targets and progress against them in our integrated report.

### Alignment with TCFD Recommendations – Metrics and Targets

Disclose the metrics used by the organisation to assess climate-related risks and opportunities in line with its strategy and risk management process.	Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 greenhouse gas (GHG) emissions, and the related risks.	Describe the targets used by the organisation to manage climate-related risks and opportunities and performance against targets.
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## GHG Emissions

We calculate and report our Greenhouse Gas (GHG) inventory i.e. Scope 1 (Stationery and Process emissions) and Scope 2 (purchased electricity) in accordance with The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (Revised Edition), defined under the World Business Council for Sustainable Development (WBCSD) and World Resource Institute (WRI).

Details of scope 1 and 2 emissions as well as energy consumption from our

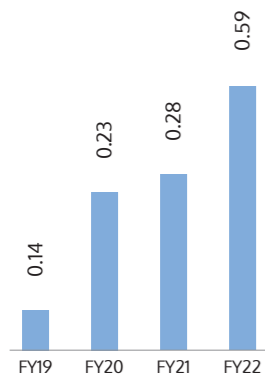
aluminium and copper businesses are given below. We also intend to enhance our GHG inventory by developing a mechanism to estimate our scope 3 emissions for aluminium and copper business. We have already developed a company level charter to estimate these emissions for activities such as procurement and travel.

During the year, total energy consumed stood at 270.7 Million GJ of which the aluminium business accounts for 96%, followed by copper (3.6%) and mining (0.14%). Resulted total GHG emissions from

the activities is 26.6 Million tCO<sub>2</sub>e. We also track energy and emission intensity of our operations. During the year, our Aluminium business has reported 70.6 GJ/MT of production as energy intensity, while for the copper business, it was 9 GJ/MT of production. We have set medium-term targets for 2025 which have been detailed out in our "Energy and Emission Performance" section.

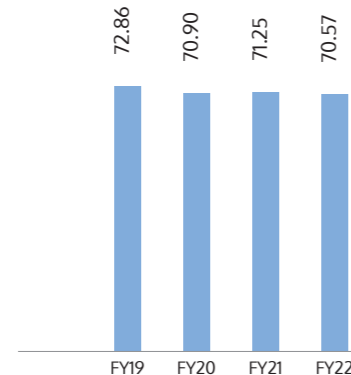
## Renewable Energy Consumption

(Mn GJ)



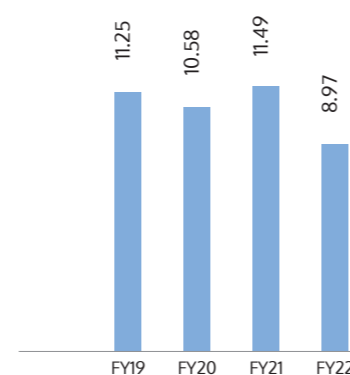
## Energy Intensity Aluminium

(GJ/MT)



## Energy Intensity Copper

(GJ/MT)



## Energy & Emissions Performance: -

Regular performance review helps us keep a track of the emissions generated from our business activities and further formulate our plans to reduce our carbon footprint. In this context, we have committed to Science Based Target initiatives (SBTi) in this financial year.

We made progress to reach the target through our philosophy of innovation that involves the following ways:

- Productivity improvement
- Technology enhancement
- Reducing Specific energy consumption
- Adoption of cleaner technology
- Reduction of waste in process

We have been able to improve our renewable energy installations and reduce our GHG emissions to meet our short-term (2023) and medium-term (2025) targets respectively. Our long-term target is to reach "Carbon Neutrality" by 2050. Development of roadmap for Carbon Neutrality is underway.

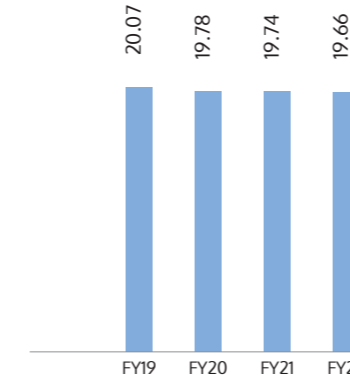
In the renewables, we have installed 50 MW of solar capacity at Renukoot, Renunagar, Mahan, Mouda and Taloja in this financial year and will have successfully achieved our set target of 100 MW by 2023, in third quarter of FY 2021-22. Another 20 MW of renewable hybrid (Solar + Wind) project at Dahej, 4 MW of biomass - based combined heat and power project at Belagavi, 9.5 MW floating solar at Mahan & 5 MW

wind project for Taloja are under execution. Additionally, 50 MW of renewable projects including renewable hybrid is under finalisation at various locations(.). We have also planned having a large scale (100-300) MW Renewable hybrid with Pumped Hydro plant for our Aditya Aluminium site, for which transmission line upgradation work in under progress. This will help us in achieving our renewable energy target of 2025.

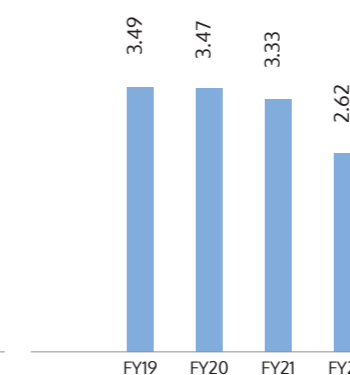
## Key Targets & Progress

2025 target	2022 Update
25% specific GHG emission reduction	18.5% reductions from 2011-12.
2025 target	2022 Update
25% specific energy consumption reduction	18% reductions from 2011-12.
2015 target	2022 Update
200 MW renewable without battery storage and 100 MW renewable with battery storage energy capacity	100 MW renewable energy capacity installed. 38 MW project are in execution, 50 MW are in finalisation.

## GHG emission intensity- Aluminium (tCO<sub>2</sub>/MT)



## GHG emission intensity- Copper (tCO<sub>2</sub>/MT)



# Metrics and Targets

## Water Withdrawal

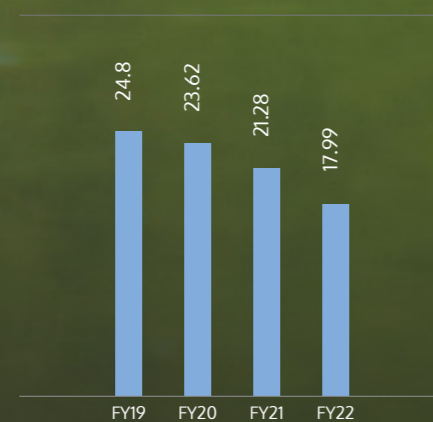
We believe in taking responsibility for optimal consumption of natural resources in our business activities. Water is a pertinent example as we rely on it to manufacture products and use it for domestic purposes as well. Hence, we are focused on optimising our current use, leveraging alternative and recycled sources of water, and managing our discharge responsibly. During the reporting year, we made good progress by reducing the amount we use, recycling wherever possible, and innovating opportunities for reuse. We have involved our employees in this effort too by training them on Water Positivity.

During the reporting period, we have withdrawn 77.9 million m<sup>3</sup> of water from surface water source. We track and monitor our water withdrawal at local level through dedicated meter network and reporting through Sustainability Data Management system. We are working towards enabling digital water meter escalations at the corporate level.

Specific freshwater consumption - Aluminium (m<sup>3</sup>/MT)



Specific freshwater consumption - Copper (m<sup>3</sup>/MT)



## Water Consumption

During the reporting period, the total water consumption was 87.7 million m<sup>3</sup> in which power plant was a major source of water consumption (65.5%) followed by production processes of combined aluminium and copper (22%). We reduce our dependence on freshwater consumption through enhanced water recycling measures. During the reporting period, aluminium and copper business were able to use 21% and 20.3% of recycled water for their operations. We have set targets for ZLD across all our plant locations which will help us reduce water withdrawal from surface water substantially across the locations.

Water Consumption - Freshwater and Recycled water (Million m<sup>3</sup>)



## Specific Water Consumption

During the year, specific water consumption intensity for aluminium business stood at 50.4 m<sup>3</sup>/MT of production. This comprised of majorly power plants followed by process operations such as refining, smelting, rolling and extrusion. In the same reporting period, specific water intensity excluding the power plants was 6.35 m<sup>3</sup>/MT of production. sewage water for gardening etc.

## Water-related targets

Snapshot of our targets and progress related to water shown here. We have developed a water balance for our respective plants to keep track of our consumption at the plant level. To create awareness among our employees, we also conduct regular trainings on water positivity. We have already installed rainwater harvesting capacity of 10.8 million m<sup>3</sup> at our sites. Our efforts have led us to undertake major projects for

water conservation and reduction, and we have plans in place for the next 5 years. We also aim to achieve water positivity across mining and downstream verticals.

During the year, some of the initiatives that resulted in reduction in water consumption include installation of water-less urinals, optimum pressure supply for water basins, maximum utilisation of sewage water for gardening etc.

## Key Targets & Progress

### 2025 target

20% freshwater consumption reduction in aluminium business

### 2025 target

Water positive across downstream and mining operations.

### 2022 Update

9% reductions from baseline of 2018-19.

### 2022 Update

3.1 Mn m<sup>3</sup> rain water harvesting storage capacity developed through CSR initiatives.

# Way Forward

As one of the leading companies in metals and mining, we understand our responsibility to continuously progress our climate change agenda. We take pride in our journey so far in managing our climate-related risks and opportunities and progress towards low carbon economy. We have incorporated TCFD recommendations in our organisation using various globally recognised frameworks, tools and standards to evaluate potential risks and implement best-in-class initiatives on climate change.

We shall always strive to ensure our resilience against climate-related risks and look for opportunities to further enhance our alignment with TCFD recommendations. We acknowledge that our goal of "Achieving Carbon Neutrality by 2050" would require more efforts and we are already moving swiftly in that direction. We have already developed several plans and intend to implement the same across our organisation and business.

Moreover, going forward, we intend to continue the following to progress on our climate change journey:

- Enhance our alignment with TCFD recommendations by undertaking a further in-depth study of relevant climate-related risks and opportunities
- Elevate our data capturing mechanisms to improve climate-related projections and scenario analysis
- Tap into new climate-related opportunities and diversify our product portfolio

- Evaluate upcoming climate-related risks and develop resilience measures for the same
- Engage with our stakeholders to better understand their perspectives and feedback on our climate change journey
- Collaborate with external partners to develop innovative solutions for decarbonising other sectors

We realise the importance of being transparent about our progress on climate change agenda and shall continue to communicate on the same in our annual disclosures. We also strive to adhere with high level of ethical standards and disclose efforts of senior management to achieve our commitments. We shall further accelerate our journey towards low carbon economy with dedicated focus on climate change to consistently deliver value to our stakeholders.





# TCFD Mapping Index

TCFD Pillar	Description	Disclosure	Section Reference	Page #
Governance	Disclose the organisation's governance around climate-related risks and opportunities.	a) Describe the board's oversight of climate-related risks and opportunities.	Governance - Board Oversight	5, 6
		b) Describe management's role in assessing and managing climate-related risks and opportunities.	Governance - Management's Role	6, 7
Strategy	Disclose the actual and potential impacts of climate-related risks and opportunities on the organisation's businesses, strategy and financial planning where such information is material.	a) Describe the climate-related risks and opportunities the organisation has identified over the short, medium and long-term.	Strategy - Our Climate-related Risks and Opportunities	9-15
		b) Describe the impact of climate-related risks and opportunities on the organisation's businesses, strategy and financial planning.	Strategy - Our Climate-related Risks and Opportunities, Path to Decarbonisation, Putting a price on carbon, Scenario Analysis and Results	16-19, 27-31
		c) Describe the resilience of the organisation's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario.	Strategy - Our Path to Decarbonisation, Putting a price on carbon, Scenario Analysis and Results	19-27
Risk Management	Disclose how the organisation identifies, assesses and manages climate-related risks.	a) Describe the organisation's processes for identifying and assessing climate-related risks.	Risk Management - Our Risk Management Procedure (Risk Identification and Assessment)	33-35
		b) Describe the organisation's process for managing climate-related risks.	Risk Management - Our Risk Management Procedure (Risk Management and Mitigation)	36-39
		c) Describe how processes for identifying, assessing and managing climate-related risks are integrated into the organisation's overall risk management.	Risk Management - Our Risk Management Procedure (Risk Monitoring and Reporting) Our Risk Resilience towards Climate Change	33-35
Metrics & Targets	Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities where such information is material.	a) Disclose the metrics used by the organisation to assess climate-related risks and opportunities in line with its strategy and risk management process.	Metrics and Targets	40-43
		b) Disclose Scope 1, Scope 2 and, if appropriate, Scope 3 greenhouse gas (GHG) emissions and the related risks.	Metrics and Targets – Energy & Emissions Performance	40-41
		c) Describe the targets used by the organisation to manage climate-related risks, and opportunities and performance against targets.	Metrics and Targets	40-43

# Abbreviations

ASC – Apex Sustainability Committee	IAI – International Aluminium Institute
B2DS – Below 2 Degree Celsius	ICP – Internal Carbon Pricing
BIS – Bureau of Indian Standards	IMS – Internal Management System
BRC – Business Review Committee	IRR - Internal rate of return
CAPEX – Capital Expenses	KRA – Key Responsibility Area
CBAM – Carbon Border Adjustment Mechanism	LME – London Metal Exchange
CCUS – Carbon Capture Utilisation and Storage	MBR – Monthly Business Review
COP – Cost of Production	MCOE – Manufacturing Centre of Excellence
CPP – Captive Power Plant	OEM – Original Equipment Manufacture
CT – Carbon Tax	P&B – Planning and Budgeting
DJSI – Dow Jones Sustainability Index	QBR – Quarterly Business Review
ERM – Enterprise Risk Management	RCP – Representative Concentration Pathways
ESG – Environment, Social and Governance	R&D – Research & Development
ETS – Emission Trading Scheme	RE – Renewable Energy
EV – Electric Vehicle	SEEM – Society of Energy Engineers and Manager
FMCG – Fast Moving Capital Goods	SOP – Standard Operating Procedure
FRP – Fibre Reinforced Plastic	SPOC – Single Point of Contact
FTA – Free Trade Agreement	TCFD – Task force on Climate related Financial Disclosure
GFANZ – Glasgow Financial Alliance for Net-Zero	WBCSD – World Business Council on Sustainable Development
GHG – Greenhouse Gas	ZLD – Zero Liquid Discharge
HVAC – Heating Ventilation and Air Conditioner	



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