Contributing to the Sustainable Development of New Energy for the World

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CHENGTUN MINING

# Chengtun Mining Group Co., Ltd.
# Climate Transition Plan

CHENGTUN MINING

**Vision**

Contributing to the Sustainable Development of New Energy for the World

**Mission**

We Transform Resources for a Better World

CTM



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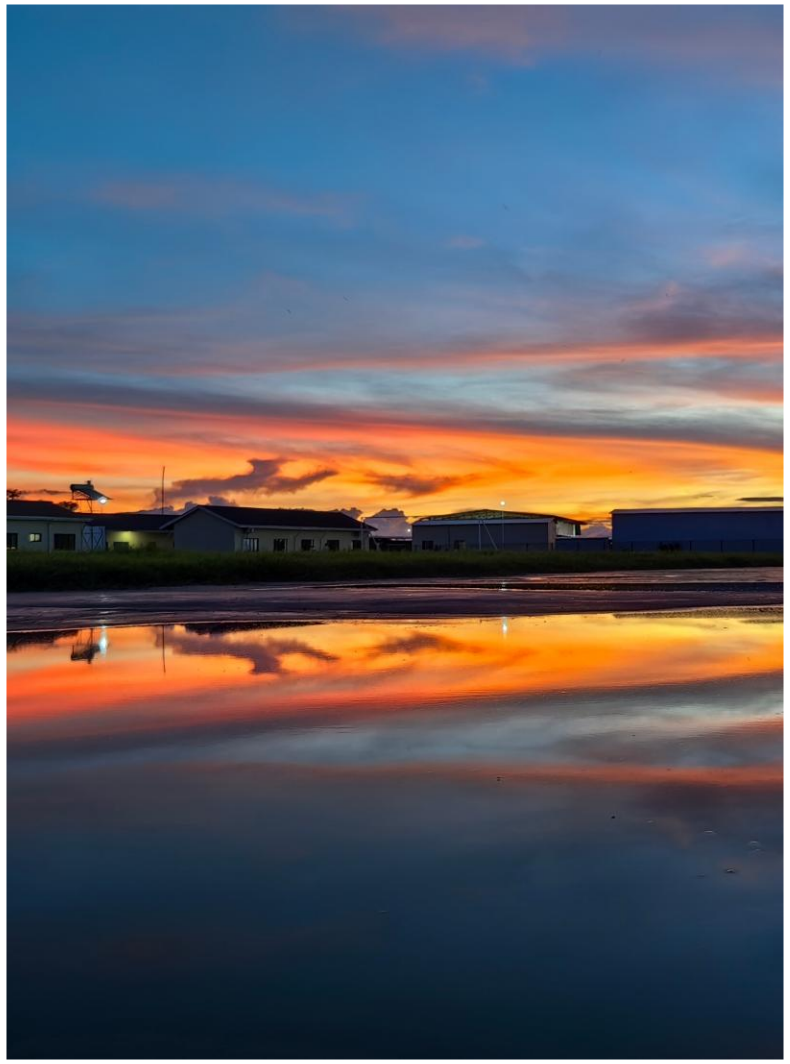
# ABOUT THIS REPORT

## Reporting boundary

This report covers Chengtun Mining Group Co., Ltd. and part of its subsidiaries.
For ease of reference and readability,major operating subsidiaries are referred to by abbreviated names in this report.
The corresponding entities are listed below:

| Name | Abbreviation |
|---|---|
| Chengtun Mining Group Co., Ltd | We, Company |
| Congo Chengtun Ressources Sarl. | CCR |
| Congo Chengtun New Materials SASU | CCM |
| Kalongwe Mining Sa | KMSA |
| Sichuan Chengtun Zinc&Germanium Science&Technology Co., Ltd. | Chengtun Zinc & Germanium |
| Kelixin (Zhuhai) New Energy Co., Ltd. | Kelixin (Zhuhai) |
| Kelixin (Yangjiang) New Energy Co., Ltd. | Kelixin (Yangjiang) |
| PT Youshan Nickel Indonesia | Youshan Nickel |
| Chengtun Energy Metal Chemistry (Guizhou) Co., Ltd. | Chengtun Energy Metal |
| Zhonghe Nickel Co., Ltd. | Zhonghe Nickel |





## Basis of Preparation

This report has been prepared with reference to the following standards and guidelines:

1.Guidelines No. 4 of the Shanghai Stock Exchange for Self-Regulation of Listed Companies — Sustainability Report Preparation No. 2: Climate Change Response

2.Sustainability Disclosure Standards for Enterprises No. 1 — Climate (Trial)

3.Recommendations of the Task Force on Climate-related Financial Disclosures (TCFD)

4.International Financial Reporting Sustainability Disclosure Standard 2 — Climate-related Disclosures (IFRS S2)

## Report access

This report is published in electronic format and is available on the following platforms:

The Shanghai Stock Exchange website (www.sse.com.cn)

The Company's official website (http://www.600711.com)

The report can be accessed, viewed online, or downloaded from the Company's official website. This report is available in both printed and electronic formats. It is prepared in both Chinese and English. In the event of any discrepancy or inconsistency between the two versions, the Chinese version shall prevail

# CHAIRMAN'S MESSAGE

**Chengtun Mining Group Co., Ltd.**
Chairman

—

**熊波**

## 01 Adopting a long-term perspective on climate change

Against the backdrop of accelerating global climate change and deepening low-carbon transition, climate change is emerging as a critical factor influencing corporate long-term operations and value creation. The increasing frequency of extreme weather events, profound shifts to energy structures, and evolving policy and regulatory requirements are compelling enterprises to reassess their development models and risk management capabilities with greater foresight and a more systematic approach. Climate change has evolved from a purely environmental concern into a core issue affecting strategic resilience, asset security, and financial stability.

## 02 Understanding responsibilities and opportunities in the low-carbon transition

As a key player in the global non-ferrous metals industry chain, we fully recognize the dual role mining enterprises play in addressing climate change.

On the one hand, mining development and smelting operations are highly dependent on energy inputs and natural conditions. Climate change, together with the resulting policy and market shifts, is expected to have a profound impact production operations, safety management and cost structures.

On the other hand, the rapid advancement of new energy, advanced materials, and green industries continues to drive demand for critical metals such as copper, nickel, and cobalt, creating new growth opportunities.

we remain committed to achieving high-quality, sustainable development by seizing transformation opportunities while maintaining stable operations.

## 03 Integrating climate governance into core decision-making

We place strong emphasis on the impact of climate change on its strategy and operations, having systematically integrated climate-related issues into its corporate governance and risk management frameworks.

The Board of Directors bears ultimate responsibility for climate-related matters and continuously monitors the potential implications of climate risks and transition trends for the company's business portfolio, capital allocation, and financial performance.

Under the Board's oversight, management conduct the climate risk identification, scenario analysis, and response planning, progressively embedding climate considerations into operational management and investment decision-making processes.

## 04 Systematically identifying climate risks and capturing transition opportunities

In terms of risk management, we continuously identified and assesses both the physical risks and transition risks arising from climate change. Physical risks, such as extreme heatwaves and heavy rainfall may impact mining operations, safety facilities, and infrastructure performance. Transition risks, including energy structure adjustments, carbon pricing mechanisms, technological advancements, and shifts in market preferences, may also affect operational costs, product competitiveness, and asset values. At the same time, advances in low-carbon technologies, improvements in energy efficiency, and the expansion of new energy supply chains present significant opportunities for the company to optimize its processes, enhancing resource utilization, and strengthening its long-term competitiveness. The company will continue to enhance its climate risk management capabilities and strengthen its resilience in addressing uncertainties.

## 05 Advancing low-carbon transition objectives and pathways

With a long-term development perspective, we have defined phased objectives and strategic directions for its low-carbon transition, while balancing safety, efficiency and responsibility. The company will actively promote energy conservation, energy mix optimization, and operational efficiency improvements, continuously reducing energy consumption and emission intensity per unit of output. It aims to achieve peak carbon emissions across operations by 2029 and carbon neutrality by 2050. These objectives will be implemented in a steady and orderly manner, taking into account the business characteristics, technological advancement pathways, and external environmental changes.

## 06 Addressing stakeholder concerns through transparent disclosure

We attach great importance to the standardization and transparency of climate-related disclosures. It actively benchmarks against the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD), continuously refining its disclosure framework covering climate governance, strategy, risk management, and metrics and targets. Through consistent and systematic disclosure, the company aims to assist investors and other stakeholders in better understanding the impact of climate change on its business and financial position, alongside its management approach and practical progress in the low-carbon transition.

## 07 Creating sustainable value for the future

Looking ahead, we will continue pursue green, low-carbon and high-quality development. While ensuring safe production and compliant operations, the company will continuously strengthen its overall capacity to address climate change.

By working closely with employees, we aim to play an active role in the global low-carbon transition and lay a solid foundation for long-term, stable development and sustainable value creation.

# CHENGTUN MINING

# Chengtun Mining at a Glance

## Company Overview

Chengtun Mining was listed in 1996 under the stock code 600711, with its headquarters located in Xiamen, China. The Company is committed to the development and utilization of non-ferrous metal resources, particularly those required for new energy batteries, with a strategic focus on copper, nickel, and cobalt. Its core business segments include energy metals, base metals, and metal trading.

After years of development, the Company has established notable strengths in brand influence, capital resources, talent development, and market channels, and has been repeatedly included among the "Top 500 Chinese Enterprises." Chengtun Mining has developed a global industrial presence, with operations and mining enterprises across China, e.g. Zhuhai, Sichuan, Yunnan, Guizhou, Inner Mongolia, as well as overseas including the Democratic Republic of the Congo and Indonesia, forming a sizeable international network of subsidiaries and mining projects.

Focusing on its core metals—copper, nickel, and cobalt—Chengtun Mining continues to respond proactively to industry developments, strengthen governance, and operate with dedication and prudence. The Company adheres to a resource-oriented strategy and an international development approach, continuously enhancing its capabilities in domestic and overseas resource exploration, project development, and operational management. At the same time, it extends its value chain through smelting, processing, and materials manufacturing, while implementing management measures centered on cost control, meticulous operational management, and quality and efficiency improvement, steadily advancing along the path of high-quality development.



## Development History

Guided by the development strategy of "securing upstream resources and expanding downstream materials", the Company remains committed to low-carbon, green, and sustainable development, while promoting coordinated growth across both domestic and international operations, contributing to the global energy transition and the development of clean energy.

## Business Segments

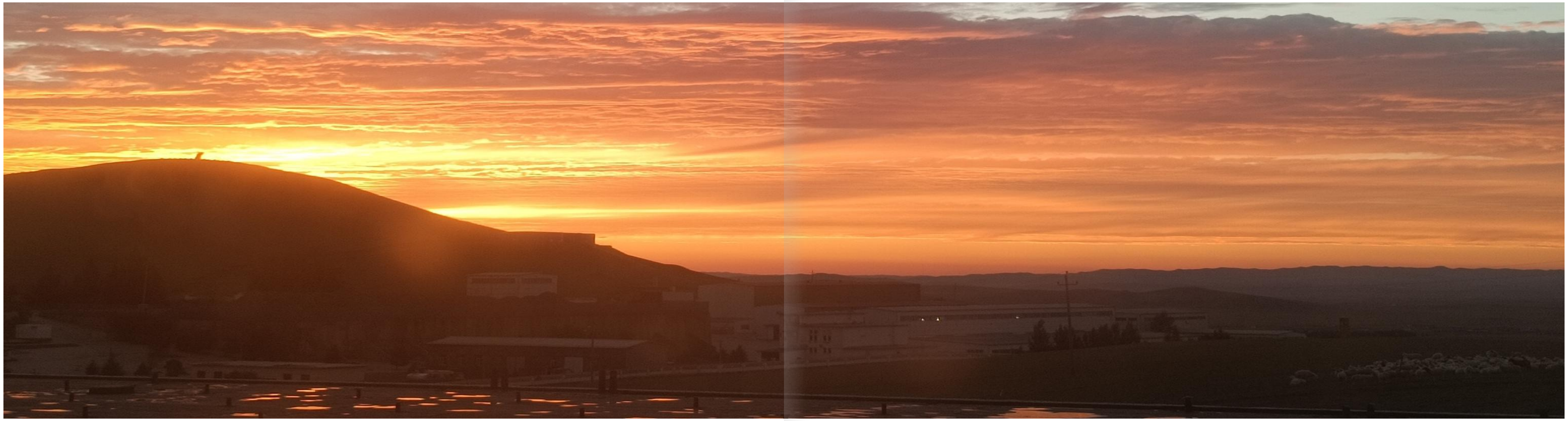
Increase reserves of high-quality resources, with a focus on expanding the development and utilization of energy metals in China, Africa, Argentina, and Southeast Asia, and strive to enhance the autonomy and resilience of supply chains for the nation and the industry.

Appropriately extend the industrial value chain by expanding downstream into core materials for power and energy storage batteries, thereby achieving an integrated layout spanning from resource development to materials production.

Promote the coordinated development of both domestic and international operations, continuously improving corporate governance and international management capabilities, while strengthening the Company's global competitiveness and influence.

## Corporate Strengths

| Group Vision | Industrial Strategy | Group Mission | Work Ethos |
|---|---|---|---|
| Contributing to theSustainable Development of New Energy for the World | Developing both Upstream Resources and Downstream Materials | We Transform Resources for a Better World | Simple, Pragmatic and Efficient |



# Our Climate Governance

# CHAPTER 01

CHENGTUN MINING

**We strengthen our climate management capabilities through a robust governance framework, transparent accountability mechanisms, and effective cross-functional coordination.**

Our climate governance system has been fully established and is entering the operational phase. In parallel with our business growth, we continue to strengthen our climate governance framework, clarify roles and responsibilities, and enhance oversight mechanisms to ensure the effective identification and management of climate risks and the timely capture of climate-related opportunities.Through board oversight, management execution, and cross-functional collaboration, we are progressively building the governance foundation to support our 2050 net-zero ambition.

- Our overall climate governance framework
- How we integrate climate considerations into our corporate operations and management
- How we implement climate-related management and oversight
- Review of emission reduction targets and results disclosure mechanism



To proactively address the physical and transition risks arising from climate change and to standardize the management and disclosure of climate-related risks, opportunities, and impacts, we formally established the “Climate Governance Management System” in 2025. This system came into effect on 31 December 2025, marking the formalization of a structured and systematic framework for climate governance.

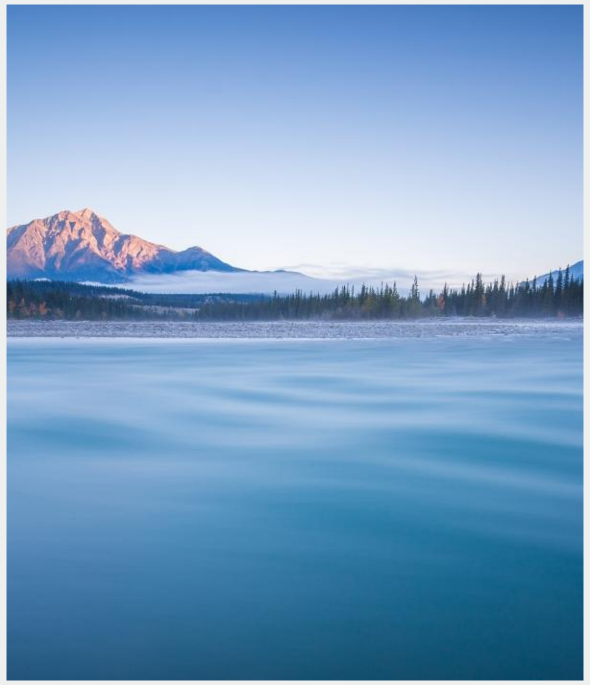
This policy has been formulated to comply with applicable laws, regulations, and regulatory requirements, including the “Corporate Sustainability Disclosure Standard No. 1 – Climate (Pilot)” and the “Administrative Measures for Information Disclosure by Listed Companies”. It aims to establish a robust and effective climate governance system, ensuring the accuracy, completeness, reliability, and timeliness of disclosures, while enhancing the company’s climate resilience and sustainable development capabilities.

In addition, the policy takes into full account the climate risk profiles associated with the company’s mining resource development and smelting operations across different regions, and is designed to systematically embed climate considerations into corporate governance, strategic planning, operational management, and decision-making processes.

The “Climate Governance Management System” applies to the company and its wholly owned and controlled subsidiaries included in the consolidated financial statements, covering key areas such as mineral extraction, smelting operations, supply chain management, and investment activities.

The system clearly defines the respective roles and responsibilities of the Board of Directors, its specialized committees, management, and executive departments in climate governance. It establishes a three-tier governance structure comprising the Board level, management level, and operational level, forming an integrated management framework in which decision-making, implementation, and oversight are closely aligned.

As a newly established and operational governance framework, we are steadily advancing the implementation of related mechanisms, including climate risk identification and assessment, data collection and reporting, internal oversight, and capacity building. We will continue to refine and strengthen our climate governance system in line with regulatory requirements and operational realities as practical experience accumulates.



OUR CLIMATE

GOVERNANCE

# 01. Our Climate Governance Framework

Within the framework of the "Climate Governance Management System", we have further clarified the organizational structure and allocation of responsibilities for climate governance and embedded the management of climate-related risks and opportunities into our existing governance system.

By establishing a multi-tier governance structure encompassing the Board, management, and operational levels, we ensure that climate-related matters are supported by clear accountability and well-defined operational pathways across strategic decision-making, operational management, and oversight mechanisms, enabling systematic management and effective supervision of climate-related issues.

## Overall Governance Framework for Climate Governance

### Board Level

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- Board of Directors

### Management Level (Executive Committee)

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- Environmental, Social and Governance(ESG)Committee

### Operational Level

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- Climate Risk Management Task Force
- Carbon Neutrality Task Force
- Mining Supply Chain Task Force
- Labor and Human Rights Task Force
- Occupational Health&Safety Force
- Biodiversity Task Force
- ESG Office
- Subsidiaries& Corporate Functional Departments

Within the framework of the "Climate Governance Management System", we have established a multi-tier climate governance structure covering strategic decision-making, overall coordination, and operational implementation, forming a vertically integrated, top-down governance system.

- The Board of Directors, as the Company's highest governing body, bears ultimate responsibility for the oversight and decision-making of climate-related governance. It approves climate-related strategies, targets, and major policies, and supervises the overall effectiveness of climate risk and opportunity management.
- Under the Board's authorization and guidance, the Environmental, Social and Governance (ESG) Committee serves as a dedicated advisory and oversight body. It coordinates climate governance initiatives, with a particular focus on reviewing climate risk identification and assessment results, the implementation progress of response measures, and climate-related disclosures, and provides professional recommendations and improvement proposals to the Board.
- At the operational level, in line with climate governance objectives, the company has established a collaborative mechanism involving multiple specialized working groups and functional departments. These include the Climate Risk Management Group, Carbon Neutrality Task Force, Mining Supply Chain Group, Labour and Human Rights Group, Occupational Health and Safety Group, and Biodiversity Group, covering key areas such as production operations, supply chain management, workforce management, and environmental protection.
- Meanwhile, the ESG Office serves as the central coordination and information hub for climate governance. It is responsible for organizing climate risk assessments, managing emissions data, consolidating information, and overseeing external disclosures, as well as coordinating with specialized teams, subsidiaries, and group functional departments to ensure the effective implementation of climate governance requirements.





Each subsidiary and HQ functional department, operating within a unified governance framework and clearly defined responsibilities, carries out climate risk management, the implementation of emission reduction measures, and information reporting in line with its respective business characteristics. This ensures the consistent application of climate governance requirements at both the HQ and business unit levels.

Through this governance structure, we have achieved effective alignment across the Board, management, and operational layers, establishing a climate governance system characterized by clear accountability, coordinated execution, and continuous improvement.

| Hierarchy | Responsibilities |
|---|---|
| Board of Directors | As the supreme decision-making body for climate-related governance, it bears ultimate responsibility.<br>Its principal duties include:<br>• Review and approve the company's climate-related strategies, objectives and major policies to ensure alignment with the company's overall development strategy;<br>• Monitor management's handling of climate-related risks and opportunities, and assess the effectiveness of the climate governance framework;<br>• Review and approve climate-related disclosure content to ensure the information disclosed is truthful, accurate and complete;<br>• Clarify the division of responsibilities for climate-related governance to ensure effective performance by governing bodies;<br>• Integrate climate performance into executive remuneration assessment systems and establish incentive and constraint mechanisms. |
| ESG Committee | An Environmental, Social and Governance (ESG) Committee shall be established under the Board of Directors to serve as a dedicated oversight body for climate-related governance. Its membership shall include directors, senior executives or external experts possessing specialized expertise in climate-related matters.<br>Its principal responsibilities shall include:<br>• Assist the Board in formulating climate-related strategies, objectives and policies, providing expert advisory services;<br>• Regularly review corporate climate risk assessment reports, opportunity analysis reports, and progress towards achieving targets;<br>• Monitor management's climate-related performance and propose recommendations for improvement;<br>• Review the draft climate related disclosure and submit disclosure recommendations to the Board of Directors;<br>• Convene at least one dedicated meeting annually to examine significant climate-related issues and submit a report to the board of directors;<br>• Organize the formulation of climate-related strategies, objectives, policies and implementation rules, submit them to the Board of Directors for approval, and then organize the implementation;<br>• Establish a cross-functional climate risk management team to coordinate climate-related work across all departments;<br>• Organize and implement the identification, assessment and response to climate risks and opportunities, reporting progress regularly to the ESG Committee and the Board of Directors;<br>• Advance the development of climate-related information systems to ensure the timeliness and accuracy of information collection, analysis and dissemination;<br>• Organize and deliver climate-related training to enhance the climate governance awareness and professional capabilities of all staff;<br>• Implement all resolutions of the Board of Directors concerning climate governance and promptly report significant climate-related matters to the Board and its specialized committees. |
| ESG Office | The ESG Office, as the central coordinating body for climate governance, is primarily responsible for:<br>• Coordinate the overall advancement of climate-related work, including organizing climate risk assessments and emissions accounting, and coordinating specialist working groups and operational departments to implement climate governance measures.<br>• Compile,review and prepare climate-related disclosures, ensuring their timeliness, compliance and consistency, whilst overseeing and tracking the implementation of climate governance across all units. |
| Climate Risk Management Group | The Climate Risk Management Group focuses on<br>• Identification, assessment and response to climate-related physical and transition risks, including analysis of the impact of extreme weather events and climate change trends on production facilities, capacity and operational stability, as well as transition risks arising from policy, market and technological shifts.<br>• Propose targeted risk management and adaptation measures, and collaborate with the ESG Office to conduct regular climate risk assessments and scenario analyses. |
| Dual Carbon Task Force | Primary Responsibilities of the Dual Carbon Task Force<br>• In relation to greenhouse gas emissions management and low-carbon transition objectives, be responsible for organizing carbon emissions accounting and carbon cost analysis, assessing financial impacts such as carbon trading gains/losses, green R&D expenditure and impairment of climate-related assets, conducting carbon cost sensitivity analysis, and providing support for management and board decision-making;<br>• Simultaneously, in light of our business characteristics, we shall evaluate climate-related opportunities arising from the application of low-carbon technologies, the growth in demand for low-carbon mineral products, and policy incentives, thereby driving the formulation and implementation of energy-saving, emission-reduction, and low-carbon transition measures. |

# 02. How we integrate climate considerations into our operational management

We regard climate change as a key factor affecting our long-term strategy, operational stability, and financial performance. Through institutionalized arrangements, we have systematically integrated climate-related risks and opportunities into core management processes, including strategic planning, investment decision-making, production operations, financial management, and supply chain management. This ensures that climate considerations are fully identified, assessed, and incorporated into all major business decisions.

## POINT 01 Incorporating climate factors into strategic planning and long-term development decisions

When formulating medium- to long-term development strategies and business plans, the Board of Directors leads management in conducting climate scenario analysis to systematically assess the physical risks, transition risks, and potential opportunities under different climate scenarios.

At a minimum, the analysis covers the carbon peak baseline scenario issued by relevant national authorities and, where feasible, also references more stringent climate scenarios to evaluate the impacts of extreme weather events, energy structure adjustments, carbon pricing policies, and other factors on mining facilities, production capacity planning, and product demand.

Based on the results of our scenario analysis, we have incorporated climate transition objectives, emission reduction pathways, technology development plans, and resource allocation priorities into our overall development strategy. This ensures that our strategic direction supports business growth while maintaining long-term resilience to climate change and evolving policy environments.

## POINT 02 Incorporating climate impact assessment mechanisms into investment decisions

We have established a mechanism to assess climate-related impacts in major investment decision-making. For significant projects such as mining exploration and development, capacity expansion, and technological upgrades, climate-related risk and impact assessments are required at the feasibility study stage.

These assessments focus on evaluating the nature and magnitude of climate risks associated with the project, its carbon emission intensity and decarbonization potential, as well as the potential implications of climate factors for projected returns and overall financial viability.

The results of climate impact assessments serve as an important input to investment decision-making. Projects that present excessive climate risks or fail to meet low-carbon development requirements are advanced with caution or excluded from implementation, thereby mitigating potential adverse impacts on long-term value at the source.

## POINT 03 Integrating climate factors into production and operational management

In day-to-day operational management, we integrate climate considerations into production planning and process decisions. Management and production teams develop advance adjustment plans and contingency measures based on extreme weather alerts, thereby reducing the potential impacts of severe weather events on production safety and operational stability.

At the same time, we continue to advance low-carbon production technologies and energy efficiency initiatives, optimize our energy mix, and reduce carbon emissions per unit of output. We regularly assess the climate resilience of our production facilities and promptly implement reinforcement and technical upgrades for assets exposed to elevated risks, thereby strengthening our overall operational adaptability to climate change.

## 04 Reflecting climate-related impacts in financial management

We incorporate climate-related factors into our financial management framework across budget planning, cost accounting, and capital allocation processes. The finance department separately identifies and reports climate-related capital expenditures, including investments in low-carbon technology research and development and energy efficiency and emission reduction facilities, to ensure adequate funding for climate transition initiatives.

At the same time, we are progressively establishing a framework to assess climate-related financial impacts. This includes identifying and analyzing items such as gains and losses from carbon trading, investments in green research and development, and impairments of climate-related assets.

By conducting carbon cost sensitivity analyses, we evaluate the potential effects of carbon price fluctuations on operating costs and profitability, thereby providing decision support for pricing strategies and cost management.





## 05 Extending climate requirements to supply chain management

In supply chain management, we incorporate suppliers' climate governance capabilities as a key evaluation criterion in supplier selection, contract execution, and supply chain optimization processes. We prioritize partners with lower carbon footprints and stronger climate risk management capabilities to strengthen the resilience and sustainability of our supply chain.

We require key suppliers to disclose emissions data by clearly defining their climate-related responsibilities in cooperation agreements. We also collaborate with suppliers on supply chain carbon footprint assessments and climate risk evaluations. Where suppliers fail to meet our climate governance requirements, we adjust cooperation arrangements as appropriate, thereby progressively strengthening the overall climate resilience of our supply chain.

## 06 Decision-making records, feedback and information disclosure

To ensure the effective integration of climate considerations into decision-making, we document and archive climate-related analyses, supporting rationales, and decision outcomes across all levels. Relevant information is incorporated into our climate disclosures in accordance with regulatory requirements, enabling investors and other stakeholders to understand the impacts of climate factors on our decisions and operations, as well as the effectiveness of their implementation.

This approach establishes a comprehensive management mechanism spanning decision-making, execution, and disclosure.

# 03. How we implement climate-related management and oversight

We have established a multi-tier management and oversight framework addressing climate-related risks and opportunities, covering internal governance and operational supervision. By integrating internal and external oversight mechanisms, we ensure that climate governance requirements are effectively implemented at all levels, thereby establishing a closed-loop system for continuous improvement.

## POINT 01 The Board of Directors and ESG Committee Oversight Mechanism

The Board of Directors, as the highest oversight body for climate governance, bears ultimate responsibility for the overall effectiveness of our climate governance system. Through regular reviews of oversight reports and dedicated agenda items, the Board conducts comprehensive assessments of the implementation of climate-related strategies, the effectiveness of risk management, and progress towards target achievement, and makes adjustments to climate strategies or governance measures where necessary.

Under the authorization of the Board, the ESG Committee performs day-to-day oversight of climate governance on the Board's behalf. It regularly reviews management's performance of climate-related responsibilities, with a particular focus on the implementation of climate strategies, the execution of risk management measures, and progress towards key targets.

The ESG Committee's oversight findings and recommendations for improvement are reported to the Board in a timely manner, providing an informed basis for Board-level decision-making.

## POINT 02 Internal Audit and Compliance Oversight

To strengthen the effectiveness of climate governance implementation, we have incorporated climate-related governance activities into our internal audit and compliance management framework.

Under the annual audit plan, the ESG Office conducts dedicated or embedded audits covering the implementation of climate-related policies, the effectiveness of risk identification and response measures, the accuracy and accounting compliance of greenhouse gas emissions data, and the completeness and reliability of climate-related disclosures.

Audit findings are reported directly to the Board and the ESG Committee, together with recommendations for corrective actions. The implementation of these actions is continuously monitored to ensure that identified issues are effectively addressed through a closed-loop management process.

## POINT 03 Daily management and self-supervision by management and executive personnel

At the operational management level, we promote the effective implementation of climate governance through regular meetings and dedicated review mechanisms. Management convenes periodic climate governance meetings to assess progress across departments and units, promptly identify issues arising during implementation, and coordinate actions to address them.

Each business and functional department conducts regular self-assessments of its climate-related activities in line with its respective responsibilities, identifying gaps in risk management, emission reduction measures, and information reporting, and formulating and implementing improvement actions.

Building on this process, the ESG Office and the Climate Risk Management Team, as lead functions, carry out periodic reviews of the implementation of climate governance measures across all units. Review reports are prepared and shared with relevant units, promoting continuous improvement.

## POINT 04 Application of Monitoring Results and Continuous Improvement

We incorporate the outcomes of climate governance oversight into our performance management and incentive mechanisms. Units and individuals demonstrating strong performance in climate governance are recognized and rewarded, while those that fail to effectively implement governance requirements are held accountable in accordance with applicable laws and regulations.

In response to issues identified through oversight and audit activities, we maintain a rectification register that specifies responsible parties, corrective actions, and completion timelines, and we continuously monitor progress to ensure that corrective measures are effectively implemented.

At the same time, drawing on insights and improvement recommendations from oversight practices, we regularly review and enhance climate-related policies, systems, and management processes, thereby continuously strengthening the maturity and effectiveness of our climate governance framework.

# 04. Review of emission reduction targets and results disclosure mechanism

In alignment with our "dual carbon" strategic objectives, we have established a target-driven management and disclosure framework on emission reduction goals. Through target setting, cascading implementation, dynamic monitoring, periodic evaluation, and transparent disclosure, we systematically advance the execution of emission reduction measures while continuously enhancing the transparency and verifiability of our decarbonization performance.

## 01 Principles for Setting and Managing Emissions Reduction Targets

We take into account the national "dual carbon" strategy, industry trends, regulatory requirements, as well as our business structure and historical emissions profile, to ensure that our targets are forward-looking while remaining achievable through disciplined and steady implementation.

Our emission reduction targets are aligned with the company' s overarching objectives and cover major sources of emissions. They are implemented through a tiered management approach that reflects the specific circumstances of different business segments and subsidiaries, providing a clear framework for target allocation, execution, and performance evaluation.

## 02 Review of the Breakdown and Implementation of Emissions Reduction Targets

During implementation, we cascade corporate-level emission reduction targets into annual plans and business unit-level objectives. This process defines the annual reduction targets, accountable parties, and implementation milestones for each subsidiary and relevant department, thereby embedding emission reduction requirements into day-to-day operations and management decision-making.

Each business unit formulates and implements targeted emission reduction measures based on its specific operating conditions, including, but not limited to, production process optimization, energy mix adjustment, energy efficiency upgrades, and improvements in management effectiveness.

We regularly consolidate and analyze the implementation status of emission reduction measures across all units, systematically reviewing progress and interim results to provide a sound basis for continuous improvement.

## 03 Dynamic Monitoring and Early Warning Mechanism for the Implementation of Emission Reduction Targets

To ensure the effective delivery of our emission reduction targets, we have established a dynamic monitoring mechanism to continuously track the implementation of mitigation measures and changes in emissions levels.

Through the regular collection and analysis of emissions data, we are able to promptly identify deviations between actual performance and targets, and assess the progress of decarbonization efforts.

Where certain units experience delays in emission reduction progress or fall short of interim targets, we promptly activate early warning and corrective mechanisms. Relevant units are required to analyze root causes, optimize mitigation measures, and implement improvements within defined timelines. The outcomes of these corrective actions are incorporated into subsequent performance and management evaluations.

## 04 Assessment of Emissions Reduction Outcomes and Continuous Improvement

Each year, based on the results of our annual carbon inventory, we conduct a comprehensive evaluation of the implementation and effectiveness of our emission reduction targets. This includes analyzing the actual impact of mitigation measures, associated costs, and emissions reduction efficiency, as well as summarizing effective practices and identifying areas for improvement.

The assessment results are used to refine emission reduction targets and implementation plans for the following year and to inform improvements in management mechanisms and resource allocation. This process supports the continuous enhancement of overall decarbonization performance through ongoing improvement.

## 05 Disclosure mechanism for emission reduction outcomes

We systematically incorporate information on progress against emission reduction targets, annual emissions trends, key mitigation measures, and their implementation outcomes into external disclosures, including our annual report and ESG report. In accordance with applicable laws, regulations, and regulatory requirements, we disclose the progress and results of our decarbonization efforts to investors and other stakeholders.

Throughout the disclosure process, we prioritize the accuracy, completeness, and reliability of information, clearly specifying emissions boundaries, calculation methodologies, and data sources. We further enhance the credibility and comparability of disclosed information through robust internal review procedures and independent third-party assurance.

## 06 Feedback Application and Mechanism Improvement

We recognize the importance of external feedback in emissions reduction management and actively consider the views and recommendations of regulators, investors, and other stakeholders regarding the disclosure of targets and performance. Such feedback is incorporated into our internal evaluation and improvement processes to optimize target management approaches, enhance disclosure quality, and continuously strengthen the maturity of our emissions reduction management framework.

CTM

# Operational greenhouse gas emissions

# CHAPTER 02

CHENGTUN MINING

## Building future competitiveness through technological innovation, energy transition and collaborative decarbonization

Our emissions reduction pathway has been preliminarily established and is being steadily implemented, reflecting our integrated approach to capacity expansion and low-carbon transition. While planning future capacity growth, we systematically assess and implement energy efficiency upgrades, fuel mix optimization, and renewable electricity procurement to reduce carbon intensity per unit of output and enhance energy utilization efficiency.
Through the phased implementation of low-carbon projects and forward-looking investments, the company is progressively building a sustainable foundation aligned with its 2050 net-zero ambition.

- Our overall emission reduction targets
- Our Scope 1 and Scope 2 emissions profile
- Our approach to reducing operational emissions
- Case studies on emission reduction initiatives





## 01. Overall targets

In line with national carbon peaking and carbon neutrality objectives the company has established the following phased climate targets:

| | |
|---|---|
| 2029 YEAR | To achieve peak greenhouse gas emissions across operations by 2029, while continuing to reduce emissions intensity through energy mix optimization and energy efficiency improvements. |
| 2050 YEAR | To achieve net-zero greenhouse gas emissions across operations and the value chain by 2050. |
| 2030 YEAR | To reduce market-based Scope 2 emissions by 20% by 2030, compared with the 2024 baseline. |
| 2030 YEAR | To reduce emissions intensity in the cobalt downstream processing segment by 45% by 2030. |
| 2030 YEAR | To reduce emissions intensity in the nickel downstream processing segment by 30% by 2030. |

CARBON EMISSIONS AT THE
OPERATIONAL LEVEL

We initiated our first organizational level greenhouse gas inventory and verification in 2024, covering organizational emissions data for 2023 and encompassing 6 subsidiaries. In 2025, three additional subsidiaries under operational control were included in the inventory and verification scope, followed by one more subsidiary in 2026.

As of 31 January 2026, our greenhouse gas inventory and verification processes covered 10 subsidiaries under operational control.

We commit to initiating the carbon inventory work for the remaining subsidiaries over which the company has operational control.

Our greenhouse gas emissions inventory is prepared in accordance with the "GHG Protocol Corporate Accounting and Reporting Standard" and "ISO 14064-1:2018", with organizational boundaries defined based on the operational control approach. Emissions data for each subsidiary are calculated using measured energy consumption, raw and auxiliary material usage, and verified financial records.

The greenhouse gases covered include carbon dioxide ($CO_2$), methane($CH_4$), nitrous oxide ($N_2O$), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride ($SF_6$), and nitrogen trifluoride ($NF_3$), all converted into carbon dioxide equivalents ($CO_2e$).

We have established a carbon data management and verification framework and will continue to update our emissions inventory on an annual basis to reflect decarbonization progress and key emission sources. We also plan to achieve full inventory coverage by 2027 for all subsidiaries under operational control that have been in operation for at least one year.

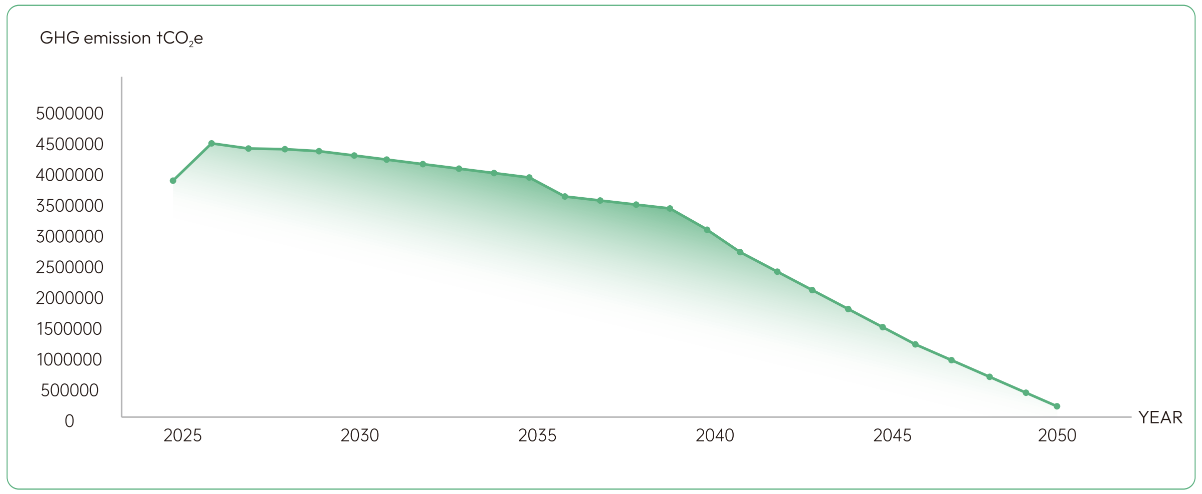




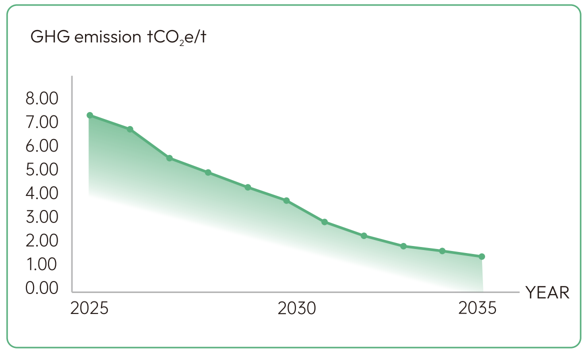
## Table: Overview of Organizational Boundaries

| Subsidiary | Location | Product | Reporting bounday |
|---|---|---|---|
| Kelixin (Zhuhai) | China | Cobalt-Series Products | Scope 1,2,3 |
| Kelixin (Yangjiang) | China | Cobalt-Series Products | Scope 1,2,3 |
| Zhonghe Nickel | China | Nickel Sulfate | Scope 1,2,3 |
| CCR | DRC | Copper Cathode,Crude Cobalt Hydroxide | Scope 1,2,3 |
| KMSA | DRC | Copper And Cobalt Ore,Copper Cathode Crude Cobalt Hydroxide | Scope 1,2,3 |
| Chengtun Energy Metal | China | Nickel Sulfate | Scope 1,2,3 |
| Chengtun Zinc & Germanium | China | Zinc Ingots, High-Purity Germanium Dioxide Related By-Products | Scope 1,2,3 |
| CCM | DRC | Copper Cathode,Crude Cobalt Hydroxide | Scope 1,2,3 |
| Youshan Nickel | Indonesia | Nickel matte | Scope 1,2,3 |

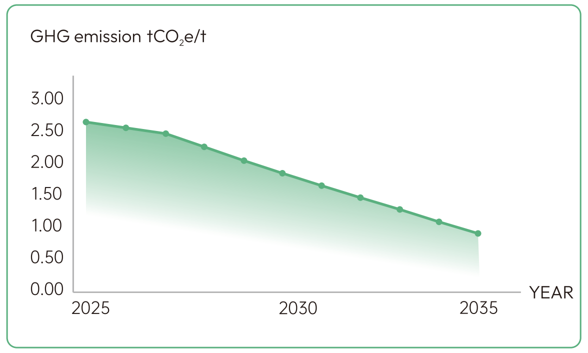
## Operational-level emission reduction pathways




## GHG intensity of cobalt processing




## GHG intensity of nickel processing



# 02. Scope 1 and Scope 2 Greenhouse Gas Emissions

To ensure the comparability of its GHG inventory, we conduct GHG inventory in accordance with internationally recognized standards, including the Greenhouse Gas Protocol: Corporate Accounting and Reporting Standard (GHG Protocol Corporate Standard) and ISO 14064-1:2018 — Greenhouse gases — Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals.

## Scope 1: Direct Emissions

Scope 1 includes direct GHG emissions from sources that are owned or controlled by the company. These emissions arise from activities within the company's operational boundaries and primarily include the following categories:

| Emission Category | Sources | Examples |
|---|---|---|
| Stationary Combustion | Boilers, kilns, generators using coal, diesel or natural gas | Natural gas–fired boilers, coal-fired units diesel generators |
| Mobile Combustion | Fuel consumption by vehicles and mining equipment | Mine haul trucks, loaders, forklifts using diesel fuel |
| Process Emissions | $Co_2$, $N_2O$, $CH_4$ from industrial chemical reactions | Rotary kiln reduction processes carbonate decomposition in smelting |
| Fugitive Emissions | Gas leakage and refrigerant releases | Emissions from refrigeration and cooling equipment |

## Scope 2: Indirect emissions from purchased energy

Scope 2 includes indirect greenhouse gas emissions resulting from the company's consumption of purchased electricity, steam, or cooling supplied by external providers. Although these emissions do not occur within the company's own facilities, they are driven by the company's energy consumption and are therefore included within its greenhouse gas accounting boundary.

In accordance with relevant standards, Scope 2 emissions are calculated using two approaches:

Location-based method: calculated using average grid emission factors, reflecting the overall emissions intensity of the regional power system.

Market-based method: calculated based on the company's actual procurement of renewable energy instruments, such as renewable energy certificates and power purchase agreements (PPAs).

For the location-based approach, the company applies provincial-level grid-average carbon dioxide emission factors published by competent authorities, representing the overall emissions profile of the local electricity system.

For the market-based approach, the company adopts the national residual mix emission factor, reflecting electricity-related emissions in the absence of verifiable renewable energy certificates.

By applying both approaches in parallel, the company is able to assess more comprehensively and objectively the climate impact of its electricity consumption.

| Emission category | Sources | Company-specific examples |
|---|---|---|
| Purchased electricity | Electricity supplied by the national power grid | Electricity used by smelters and chemical production lines |
| Purchased heat | Heat supplied by centralized district heating systems | Steam supplied by industrial park utilities |
| Purchased cooling | Externally supplied industrial cooling services | Not applicable |





## Overall emissions profile

In the 2024 base year, the company's total scope 1 and scope 2 amounted to 3,825,466 $tCO_2e$ under the location-based approach and 4,487,574 $tCO_2e$ under the market-based approach.

Specifically:

- **Scope 1: 3,478,261 $tCO_2e$**
- **Scope 2 (location-based): 347,205 $tCO_2e$**
- **Scope 2 (market-based): 1,009,313 $tCO_2e$**

Overall, the company's emissions are primarily driven by energy consumption and process reactions, reflecting the typical characteristics of the mining and metal processing industry, which is associated with high energy intensity and significant process-related emissions. Among all emission sources, smelting furnaces and kilns, boiler systems, and coal-fired power generation processes are the main contributors.

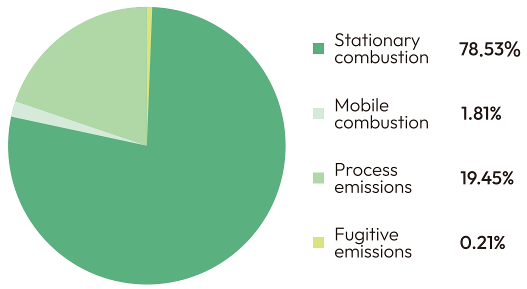
## Scope 1: composition and key drivers of direct emissions

Scope 1 includes direct greenhouse gas emissions generated from sources that are owned or controlled by the company, arising mainly from fuel combustion, industrial process reactions, equipment leakage, and vehicle operations.

**In the 2024 base year, the breakdown of scope 1 emissions was as follows**

| Emission source | Emissions ($tCO_2e$) |
|---|---|
| Stationary combustion | 2,731,486 |
| Mobile combustion | 62,944 |
| Process emissions | 676,646 |
| Fugitive emissions | 7,186 |
| Total | 3,478,261 |

**Scope 1 breakdown**




### 01 Stationary combustion sources

Stationary combustion is the largest contributor to the company's scope 1, accounting for nearly 80% of the total.

These emissions mainly arise from the combustion of coal, diesel, and natural gas in equipment such as rotary kilns, natural gas–fired boilers, and coal-fired power units. They are concentrated in smelting and heat-intensive production processes. In particular, subsidiaries in Indonesia and the Democratic Republic of the Congo (DRC) face high energy demand, limited local energy resources, and underdeveloped infrastructure, resulting in continued reliance on fossil fuels. As a result, stationary combustion represents the most significant source of direct emissions and the largest contributor to the company's overall carbon footprint.

### 02 Mobile combustion sources

Mobile combustion emissions primarily originate from fuel consumption by transportation and material-handling equipment within mining sites and industrial facilities, including diesel trucks, loaders, forklifts, and other non-road machinery. In particular, diesel-powered engineering vehicles remain the main energy source in mining and logistics operations in the DRC, due to the very limited penetration of electric vehicles, underdeveloped power grid infrastructure, and a lack of charging facilities. In China, mobile combustion emissions mainly result from the use of diesel forklifts.

Although mobile combustion accounts for only around 1.8% of scope 1 emissions, the company has incorporated vehicle electrification into its long-term strategic planning.

### 03 Process emissions

Process emissions account for approximately 19.5% of total scope 1 emissions and mainly arise from metal smelting and chemical reaction processes. During rotary kiln smelting, the decomposition of carbon-based reducing agents generates carbon dioxide. In addition, carbonates are important auxiliary materials in smelting processes and release carbon dioxide when heated.

Process emissions exhibit strong industry-specific characteristics and are highly influenced by reaction formulations, raw material properties, and process routes. They represent the company's second-largest source of operational emissions.

### 04 Fugitive emissions

Fugitive emissions are relatively low, at approximately 7,000 $tCO_2e$, accounting for about 0.2% of scope 1 emissions. They mainly result from refrigerant leakage in cooling and refrigeration systems.

Such emissions are typically dispersed and difficult to monitor. Although their overall contribution is limited, the company continues to strengthen equipment sealing and refrigerant management to prevent unintended releases and ensure effective control.





## Scope 2 emissions: indirect emissions from purchased energy

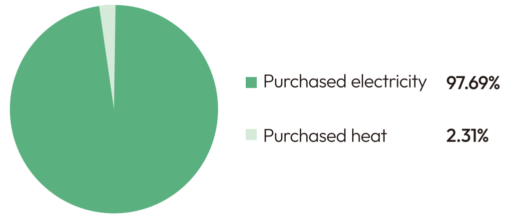
The company calculates scope 2 using both the location-based and market-based approaches. Under the location-based method, provincial grid-average electricity emission factors published by competent authorities are applied. Under the market-based method, the company adopts the national residual mix emission factor.

Scope 2 emissions mainly arise from externally purchased electricity and heat. In the 2024 base year, location-based scope 2 emissions amounted to 347,205 $tCO_2e$, with the following breakdown:

**In the 2024 base year, the breakdown of scope 2 emissions was as follows (location-based)**

| Emission source | Emissions ($tCO_2e$) |
|---|---|
| Purchased electricity | 339,183 |
| Purchased heat | 8,021 |
| Total | 347,205 |

**Scope 1 breakdown**




Purchased electricity is the dominant source of the company's scope 2 emissions, accounting for 97.7% of the total. Variations in regional power generation mixes across operating locations have a material impact on the company's overall indirect emissions profile.

Under the market-based approach, as the company has not purchased renewable energy certificates or entered into green power purchase agreements, all electricity consumption is calculated using the national residual mix emission factor. Accordingly, market-based scope 2 emissions for the 2024 base year amounted to 1,009,313 $tCO_2e$.

As the market-based method relies on a uniform national emission factor and does not provide province-level differentiation, a notable gap exists between the results derived under the location-based and market-based approaches. This difference reflects regional variations in electricity generation structures and underscores the importance of expanding access to verifiable low-carbon electricity sources in the future.

### 01 China operations

The company's nickel, cobalt, zinc, germanium, and chemical processing facilities in China primarily source electricity from the Guangdong, Sichuan, and Guizhou power grids.

The Guangdong grid is dominated by coal-fired generation, supplemented by hydropower and nuclear power, with an average emission factor of 0.4403 kg $CO_2$/kWh, which is below the national average. The Sichuan grid is predominantly hydropower-based and has a high share of low-carbon electricity, making it the region with the lowest scope 2 emissions intensity for the company, with an emission factor of 0.1404 kg $CO_2$/kWh. In Guizhou, the local grid remains largely coal-based, and power imports are required during peak demand periods, resulting in a relatively high emission factor of approximately 0.4989 kg $CO_2$/kWh.

The national residual mix emission factor is 0.5856 kg $CO_2$/kWh.

### 02 Indonesia operations

Youshan Nickel in the Weda Bay Industrial Park in Indonesia primarily rely on on-site captive coal-fired power plants, with coal accounting for nearly 100% of the power generation mix. These plants operate under high-load, continuous conditions, with emission factors of approximately 0.9–1.1 kg $CO_2$/kWh, which are significantly higher than international grid averages.

As electricity is generated by the company's own coal-fired units, the associated coal combustion emissions are accounted for under scope 1 and are therefore not double-counted under scope 2.

### 03 Democratic Republic of the Congo (DRC) operations

In 2024, electricity for the company's operations in the CCR, CCM and KMSA, was mainly supplied by the local power grid and imported electricity from Zambia. Given the country's abundant hydropower resources, the grid electricity mix is largely hydropower-based, resulting in very low grid emission factors.

However, local grid infrastructure remains underdeveloped, leading to frequent power outages and unstable supply. To ensure continuous operations, mining sites rely on captive generation and energy storage systems. As current hydrological conditions near the facilities are insufficient to support the construction of hydropower plants, electricity is mainly generated through diesel generators and coal-fired units, supplemented by waste-heat-driven steam turbines.

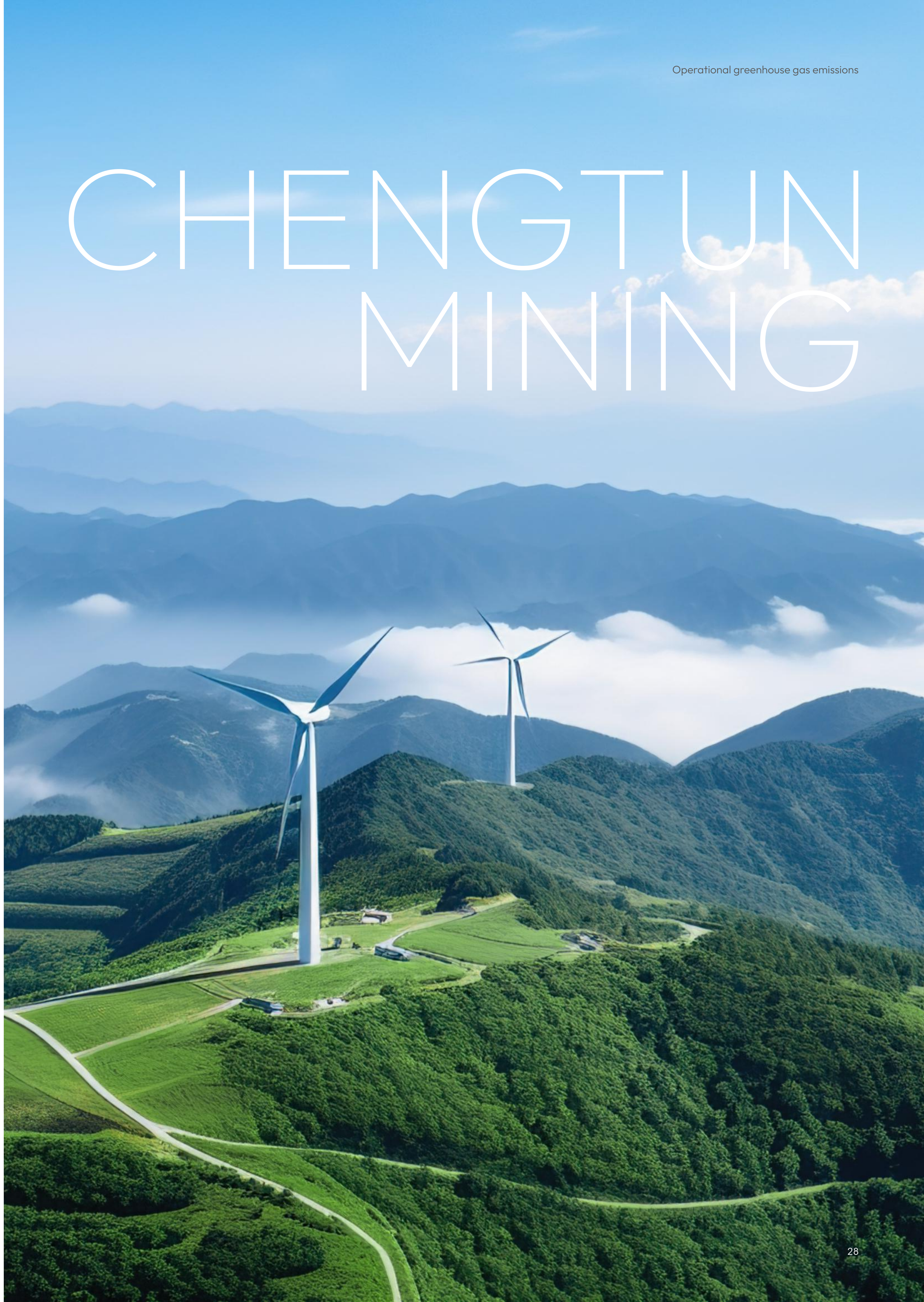
This generation mix has relatively high emission factors and contributes to elevated electricity-related carbon emissions in the region. Looking ahead, as grid infrastructure in the DRC continues to improve, regional power carbon intensity is expected to decline significantly.

# 03. Approach to reducing operational carbon emissions

The emission reduction pathways, targets, and measures described in this section are based on current technological feasibility, existing energy structures, and the company's business development plans. They represent the company's minimum and conservative decarbonization strategy at this stage.

The company recognizes the rapid evolution of clean technologies, policy frameworks, and energy markets. Accordingly, it will regularly review progress, assess the effectiveness of mitigation measures, and dynamically adjust its targets and pathways in each disclosure cycle based on the latest scientific developments and operating conditions. The company's long-term commitment extends beyond achieving current targets and focuses on continuously strengthening its climate ambition, with the aim of accelerating emission reductions whenever conditions permit, demonstrating leadership and accountability in climate action.

The company is committed to prioritizing structural and substantive emission reductions rather than relying on external carbon offsets. It will not use carbon credits to substitute for its own mitigation responsibilities. The primary focus is on achieving sustained emissions reductions through verifiable and measurable actions, including energy consumption optimization, process innovation, fuel substitution, equipment electrification, and waste-gas utilization. The use of carbon credits is considered only as a transitional and supplementary measure under exceptional technical or supply constraints, rather than as a core decarbonization pathway.

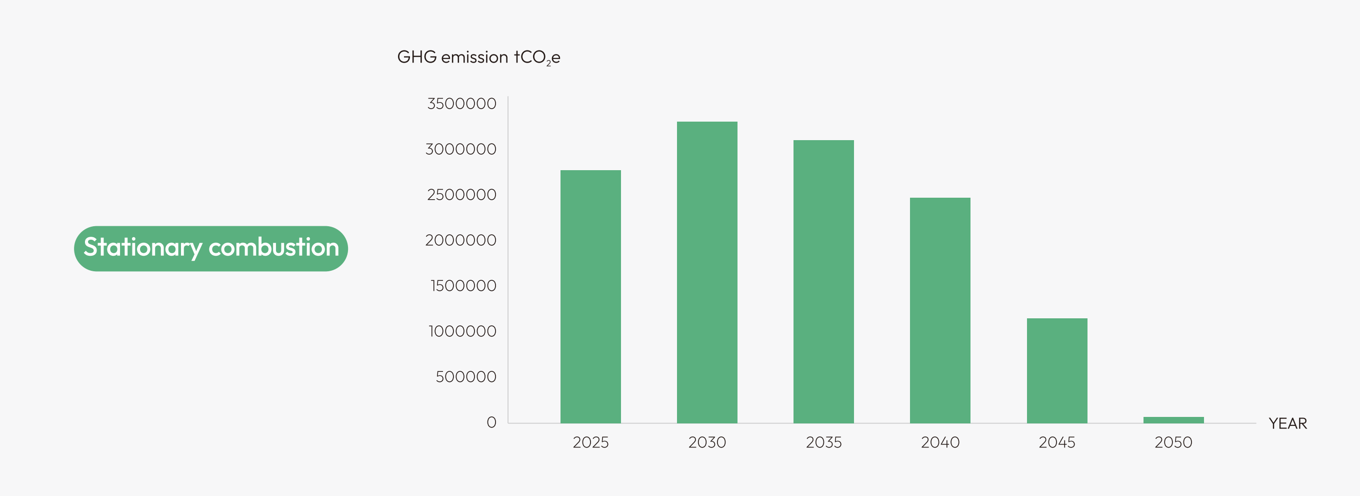


## Stationary combustion

The company's main stationary combustion emission sources include rotary kilns, converting furnaces, and coal-fired power units across its subsidiaries. At present, rotary kilns and converting furnace systems mainly rely on anthracite as their primary fuel. Under current technical conditions, this process route is difficult to fully replace with low-carbon energy alternatives.

In response, the company is exploring the introduction of carbon dioxide capture and mineralization technologies at the flue gas treatment stage. This approach involves reacting captured $Co_2$ with process by-products or newly introduced additives to form stable carbonate solids. These carbonates can be reused internally as construction fillers or slag-stabilizing agents, thereby preventing subsequent decomposition and re-release of carbon dioxide.

Where such products are sold externally, the company will implement strict use restrictions and monitoring mechanisms to ensure the long-term durability of carbon storage and to prevent the re-emission of $CO_2$ during downstream use or disposal.




Stationary combustion represents the largest share of the company's overall greenhouse gas emissions and remains the core source of operational carbon emissions. At present, emissions are mainly concentrated in the coal-fired power units, rotary kilns, and converting furnace systems at Youshan Nickel, KMSA, CCR, and CCM. Due to constraints related to local energy availability and infrastructure, coal-based systems remain the only viable option for maintaining continuous production at this stage.

- In the DRC, grid power supply remains unstable and national electricity infrastructure coverage is limited. As a result, KMSA, CCR, and CCM rely on captive coal-fired and diesel generators to ensure stable smelting operations and energy supply.
- Youshan Nickel within an isolated power system without access to the national grid. The entire industrial park is supplied by on-site coal-fired power plants to maintain uninterrupted operation of smelting equipment.

The company is pursuing a phased approach to energy structure optimization and technological upgrading, with the objective of steadily reducing emissions intensity. Over the next five to twenty-five years, key actions will include:

1. Installing waste heat recovery power generation and energy efficiency monitoring systems across operating sites to reduce energy consumption per unit of output;
2. Carbonate mineralization and permanent carbon storage technologies;
3. Transitioning all smelting facilities in China to electricity-based and clean heat supply systems, with the gradual phase-out of coal-based energy sources;
4. Advancing clean upgrading of coal-fired units at Youshan Nickel, KMSA, CCR, and CCM, including the development of renewable energy facilities combined with energy storage, assessment of LNG substitution, and integration of carbon capture, utilization, and storage (CCUS) solutions.

As illustrated in the pathway diagram, emissions from stationary combustion sources are expected to decline from approximately 2.8 million $tCO_2e$ in 2025 to near net zero by 2050. Despite interim fluctuations, the overall downward trajectory is clear, reflecting the company's proactive adjustments under energy constraints and its long-term commitment to decarbonization.





## $CO_2$ utilization and substitution of neutralizing agents

In the company's production operations, $CO_2$ is used in water treatment and in the application of ammonium bicarbonate as a neutralizing agent. These processes are associated with the decomposition and release of $CO_2$.

To address this issue, the company is progressively evaluating the following substitution and control measures:

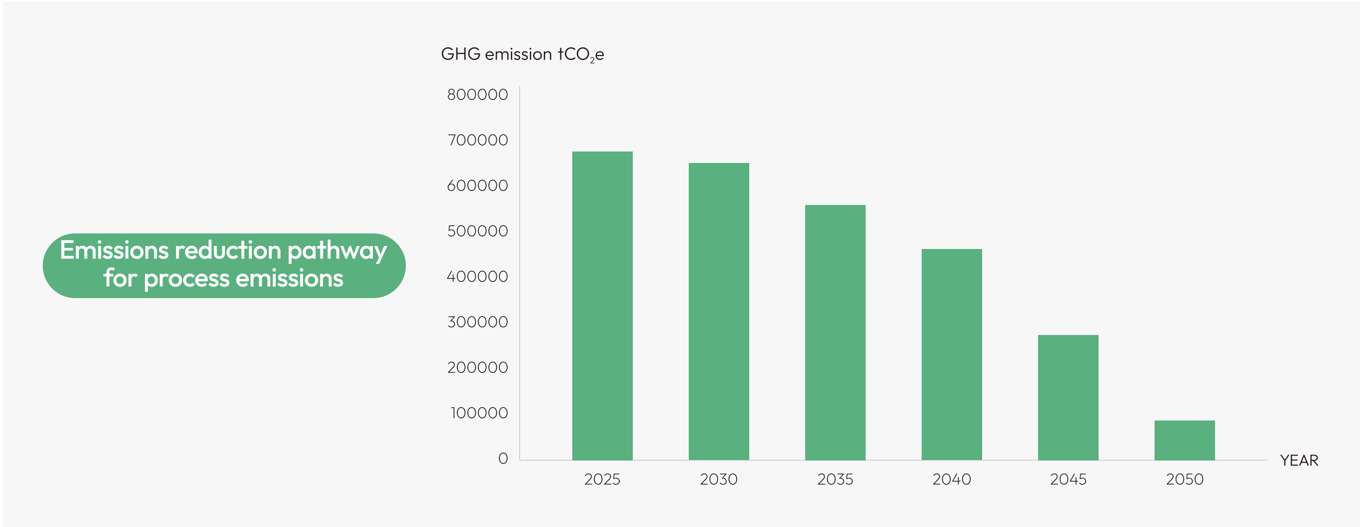
**Alternative reagent pathways**

replacing ammonium bicarbonate with sodium hydroxide, calcium hydroxide, or other non-carbon-based neutralizing agents, in order to reduce the risk of secondary emissions;

**Control of sequestration applications**

capturing discharged $CO_2$ through flue gas treatment systems and chemically converting it into stable carbonate solids, with priority given to long-term sequestration uses (such as internal construction fillers and slag-stabilizing agents), thereby preventing diversion to downstream applications where decomposition may occur.

Through these measures, the company aims to maximize the permanence of process-related $CO_2$ utilization and sequestration, while maintaining operational stability and enhancing overall emissions reduction performance.




### 01 DRC mining operations: carbonate decomposition in copper–cobalt smelting

During the beneficiation and smelting of copper–cobalt ores in the DRC, raw ores contain a high proportion of copper carbonate, and additional carbonates are used as auxiliary materials. During smelting and roasting, these minerals decompose under high temperatures and release carbon dioxide, representing the main source of process emissions in the DRC operations.

As ore characteristics largely determine reaction pathways, no mature large-scale alternative technologies are currently available internationally. As a result, these emissions are considered geologically driven and largely unavoidable under existing technical conditions.

### 02 China operations: chemical neutralization and carbonate reactions

In the company's operations in China, including nickel, cobalt, zinc, and germanium processing, certain neutralization and water treatment use carbonates or ammonium bicarbonate as neutralizing agents. In addition, anthracite is still used as a reducing agent in smelting processes, generating carbon dioxide at high temperatures.

Together, emissions from chemical neutralization and reduction reactions constitute the main sources of process emissions in China.

Process emissions are constrained by reaction mechanisms and raw material characteristics. Current mitigation efforts therefore focus primarily on flue gas treatment and circular utilization. The company is undertaking the following research and pilot initiatives:

- **Flue gas capture and mineralization:** introducing $CO_2$ absorption and mineralization technologies into exhaust gas treatment systems to convert part of the emitted carbon dioxide into stable carbonate solids;
- **Sequestration stability assessment:** evaluating the long-term stability of carbonate products and the risk of downstream carbon leakage arising from potential decomposition during subsequent processing or market use.

Since 2026, the company has initiated research on flue gas mineralization projects, with the objective of achieving preliminary engineering-scale application by 2030. This pathway represents a key solution for addressing process emissions and forms an important technological foundation for the company's future low-carbon smelting system.

## Purchased electricity

In the 2024 base year, location-based emissions from purchased electricity amounted to approximately 339,000 $tCO_2e$, accounting for 97.7% of scope 2 and representing the principal source of indirect operational emissions.

The company's facilities in China (Kelixin (Zhuhai), Kelixin (Yangjiang), Chengtun Energy, Chengtun Xinzhe, and Zhonghe Nickel) are mainly connected to the Guangdong, Guizhou, and Sichuan power grids. These grids have relatively high shares of hydropower and nuclear power, resulting in emission factors below the national average. In contrast, Youshan Nickel in Indonesia's Weda Bay Industrial Park operates within an isolated power system without access to the national grid and relies entirely on captive coal-fired power plants, leading to high emission intensity. Electricity supply for KMSA, CCR, and CCM is mainly sourced from the DRC national grid, imported power from Zambia, and captive diesel generators.

The company recognizes that emissions associated with purchased electricity are not fully within its direct control and are fundamentally constrained by national and regional power system structures.

### 01 Indonesia

The industrial park operates as an isolated grid system, currently relying on coal-fired units for baseload power. Although the park operator has planned pilot solar and wind projects, large-scale transition depends on broader infrastructure upgrades at the park level.

### 02 DRC

Limited national grid coverage and frequent power outages require mining operations to rely on diesel generators, coal-fired units, and energy storage systems to ensure continuous production, resulting in electricity carbon intensity well above international averages.

### 03 China

Benefiting from ongoing optimization of the power mix—particularly increased hydropower and nuclear capacity in southwestern regions—emissions intensity at domestic facilities has shown a declining trend, although it remains subject to regional grid factor fluctuations.

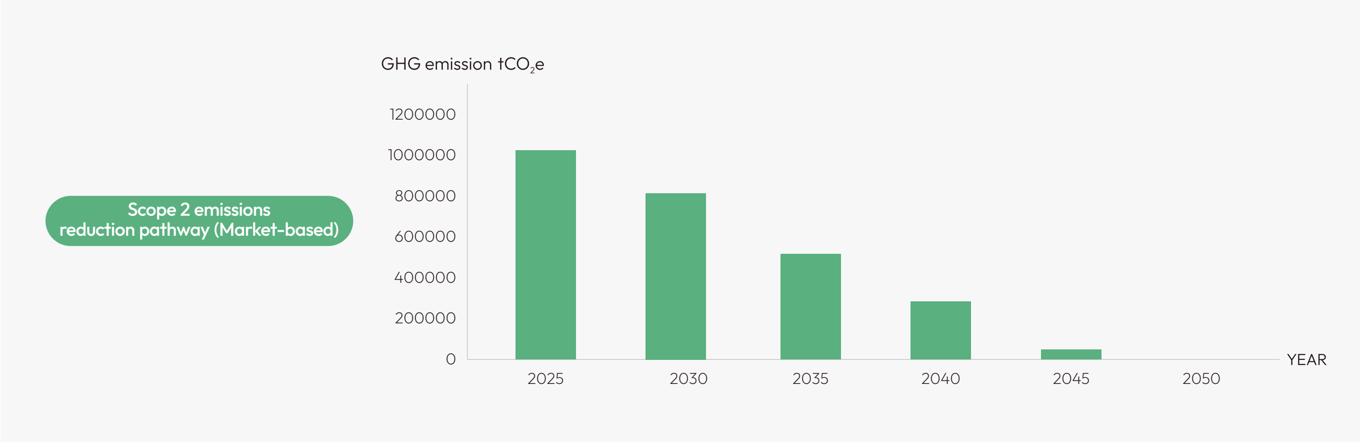
These conditions indicate that the company faces structural energy constraints in the short term. Through long-term planning and phased investment, the company will proactively promote the decarbonization of electricity supply where enabling conditions permit.





## Emissions reduction targets

Under the market-based approach, the company has set a near-term target to reduce total scope 2 emissions by 20% by 2030 relative to the 2024 base year.




This target covers all nine domestic and overseas subsidiaries that are currently included in the company's GHG inventory. The company's scope 2 decarbonization pathway will be implemented in three successive phases:

- **Phase 1** — **Energy efficiency enhancement:** Focusing on equipment retrofits, intelligent monitoring systems, and load optimization across all facilities to reduce electricity consumption per unit of output and establish a foundation for subsequent renewable energy substitution;
- **Phase 2** — **Procurement of renewable energy certificates**: Achieving phased emission reductions under the market-based approach through the purchase of eligible renewable energy certificates;
- **Phase 3** — **Direct procurement of renewable electricity (PPA):** Transitioning toward long-term power purchase agreements with electricity suppliers to secure physically deliverable and time-matched renewable power supply.
- **In parallel** — throughout Phases 1 to 3, the company will continue to develop distributed photovoltaic systems, waste heat power generation, and energy storage facilities to increase the proportion of self-generated and self-consumed electricity and reduce reliance on external power supply.

All renewable energy certificates and green electricity procured by the company will strictly comply with the quality criteria set out in the "GHG Protocol Scope 2 Guidance" and the principles of RE100.

| Scope 2 quality criterion | Company implementation requirement |
|---|---|
| Legal and regulatory recognition | Only renewable energy certificates officially issued by national or local authorities are accepted |
| Attribute uniqueness | Each certificate is used only once, with no double counting |
| Temporal matching | Certificates used for annual claims must fall within a 21-month window (6 months before to 3 months after the reporting year) |
| Geographic matching | Priority is given to renewable electricity deliverable within the same grid region |
| Technical deliverability | Purchased renewable electricity must be physically deliverable to the consumption area |
| Traceability and transparency | Full records of source, serial numbers, and retirement dates are maintained and disclosed publicly |

## Phased roadmap for scope 1 emissions reduction

Short term

### 2025–2035 foundation building and initial low-carbon substitution

Stationary combustion upgrades: implement energy efficiency retrofits for coal-fired boiler systems, prioritizing efficiency improvements and waste heat recovery projects.

Flue gas mitigation pilots: launch carbon capture and mineralization pilot projects at major smelting facilities to convert part of the flue gas $CO_2$ into stable carbonate solids for long-term storage.

Process-level neutralizer substitution trials: conduct pilot programs in downstream processing and chemical production to replace carbon-based neutralizing agents (such as ammonium bicarbonate) with non-carbon alternatives (e.g., sodium hydroxide and calcium hydroxide).

Enhancement of emissions monitoring and accounting systems: establish a comprehensive energy consumption and emissions database covering all subsidiaries to provide an accurate baseline for future technical upgrades and decarbonization planning.

Medium term

### 2036–2045 technology deepening and system optimization

Low-carbon smelting upgrades: introduce lower-carbon reducing agents into core smelting processes as technologies mature, reducing overall carbon intensity.

Industrialization of $CO_2$ mineralization and storage: expand the application of carbonate mineralization and sequestration technologies based on successful pilots, enabling partial permanent storage and utilization of smelting-related flue gas emissions.

Full deployment of material and process substitution: complete the replacement of carbonate-based auxiliary materials across operations to further reduce process-related $CO_2$ emissions.

Long term

### 2046–2050 structural decarbonization and net-zero achievement

Transition to low-carbon fuel systems: phase out coal-based fuels and transition primary energy use in smelting and auxiliary facilities toward clean electricity and low-carbon fuels.

Integrated carbon capture, utilization, and storage system: establish a company-wide system integrating capture, transport, mineralization, and long-term storage of flue gas $CO_2$.

Zero-carbon process innovation and circularity: adopt hydrogen-based reduction and other near-zero-carbon smelting technologies, while enhancing high-value utilization of slag and by-products to enable both energy and material circularity.



## Phased roadmap for scope 2 emissions reduction

Short term

### 2025–2030 energy efficiency coordination and initial clean substitution

Energy efficiency coordination: reduce electricity consumption per unit of output through equipment retrofits, load optimization, and energy efficiency improvement initiatives.

Pilot procurement of renewable energy certificates and green power: initiate renewable energy certificate procurement at selected subsidiaries, ensuring compliance with temporal matching requirements (including the 21-month rule) for credible accounting.

Medium term

### 2031–2040 large-scale renewable electricity transition

Development of distributed renewable projects: install self-consumption photovoltaic systems at smelting and chemical facilities, and co-develop shared energy storage systems within industrial parks to increase the share of self-generated renewable electricity.

Optimization of electricity contract structures: participate in spot and long-term electricity markets and enter into renewable power purchase agreements (PPAs) to secure stable clean electricity supply.

Coal-to-electric transition: progressively retire coal-based captive power units and shift toward externally sourced low-carbon electricity, reducing coal use while simultaneously lowering power-related carbon intensity.

Long term

### 2040–2050 full renewable electrification and zero-carbon power supply

With the continued expansion of renewable energy deployment and declining costs, the company aims to achieve 100% renewable electricity for purchased power. This will be supported not only by renewable electricity contracts but also by large-scale development of owned renewable energy assets, increasing the proportion of self-generated and self-consumed clean electricity.

## Emissions reduction case studies

### Case 1 Energy efficiency improvement and fuel optimization project at Chengtun Zinc & Germanium

As one of the company's major smelting bases, Chengtun Zinc & Germanium has implemented a comprehensive energy efficiency and fuel optimization program since 2024. The project focuses on the core objectives of reducing electricity consumption, lowering coal use, improving operational efficiency, and strengthening resource recovery.

According to data from September 2025, unit power consumption was reduced to 557.89 kWh per tonne of dry slag, representing a decrease of 122 kWh per tonne compared with the internal optimization target of 680 kWh per tonne.

Through cleaning and optimization of the flue gas system, operating frequencies of key fans were significantly reduced after start-up. The frequency of sulfur dioxide exhaust fans declined from 32–33 Hz to 27–28 Hz, while high-temperature smelting furnace fans were reduced from 38 Hz to 27 Hz. Together, these measures deliver electricity savings of approximately 150 kWh per hour, equivalent to around 108,000 kWh per month, corresponding to an estimated annual emissions reduction of approximately 180 $tCO_2e$.

In parallel, the facility has planned the installation of one 3 MW back-pressure screw turbine generator and one 2.5 MW condensing screw turbine generator, together with supporting auxiliary systems. At present, a 2.5 MW waste heat power generation unit is already in operation, generating approximately 737,530 kWh per month using residual heat from smelting exhaust gas. This self-generated clean electricity is used on-site, effectively offsetting part of purchased power and enhancing energy security. The project is expected to deliver annual emissions reductions of approximately 1,200 $tCO_2e$.

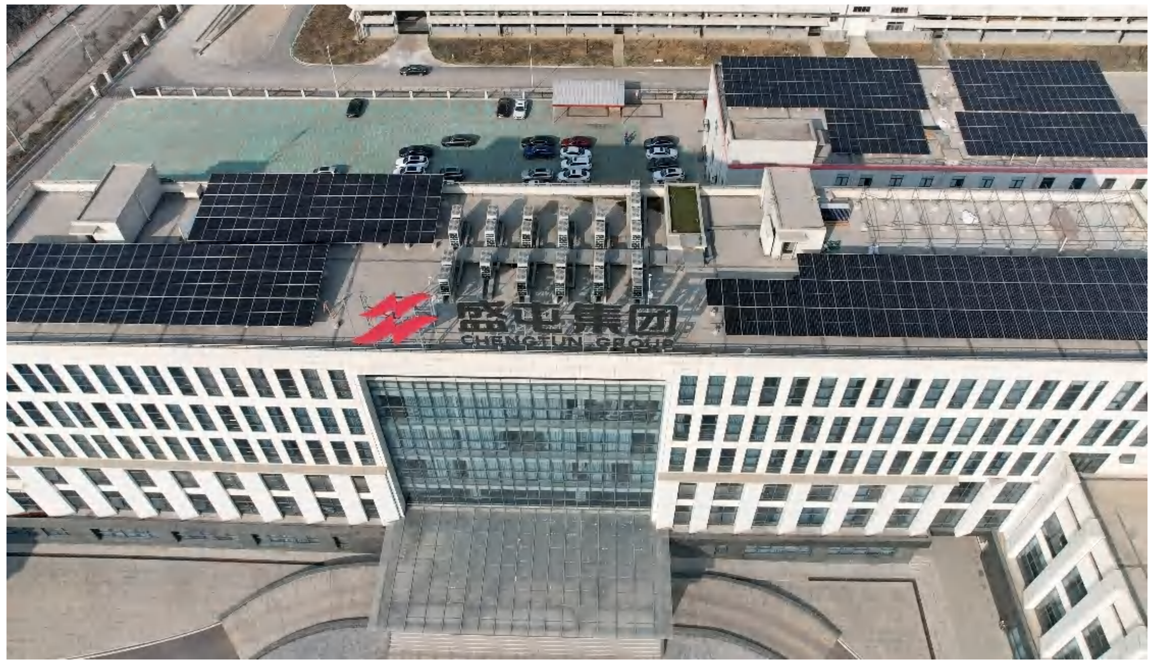
### Case 2 Distributed photovoltaic project at Chengtun Energy Metal

Chengtun Energy is actively implementing the company's clean energy transition strategy through the development of a rooftop distributed photovoltaic (PV) power generation project.

The project has a total installed capacity of 9.23 MW and was officially connected to the grid and commissioned on 18 January 2025. It uses high-efficiency 615-series monocrystalline silicon modules installed in a distributed rooftop configuration across major production facilities, including electrolysis, extraction, and integrated recycling workshops.

The system is designed to generate approximately 7 million kWh of electricity annually. Based on the June 2025 photovoltaic settlement tariff in Guizhou of RMB 0.48 per kWh and an industrial grid electricity price of RMB 0.60 per kWh, the project is expected to deliver annual electricity cost savings of approximately RMB 840,000.

In addition, the project reduces purchased electricity by around 7 million kWh per year, corresponding to an estimated scope 2 emissions reduction of approximately 3,600 $tCO_2e$.




### Case 3 Waste heat power generation project at Chengtun Energy Metal

As part of its energy efficiency and cascading energy utilization strategy, Chengtun Energy has commissioned a screw expander-based waste heat power generation system, enabling efficient recovery of medium-pressure steam from the roasting process.

The project utilizes 4.1 MPa medium-pressure steam generated by the roasting furnace. The residual pressure energy of the steam drives a screw expander connected to a generator, converting pressure energy into electricity. After power generation, the steam pressure is reduced to 0.6–1.0 MPa and is directly returned to the production system for use as low-pressure steam.

The system is configured with two units, with installed capacities of 1×1.5MW and 1×2.5MW, delivering a rated output of 3,000 kWh per hour. Electricity is generated at 10 kV and consumed on-site. The project is expected to reduce scope 2 emissions by approximately 4,300 $tCO_2e$ annually.

## Case 4

Centralized photovoltaic and storage project at CCR

To address frequent grid disruptions and the high emissions intensity associated with diesel-based generation, the company launched an integrated solar with storage project in 2025. The system combines distributed photovoltaic generation with battery energy storage to provide stable and lower-carbon electricity for smelting operations.

Phase I of the project includes 10.8 MW of photovoltaic capacity, supported by a 10 MW / 11.7 MWh energy storage system, and was commissioned in 2025. The system is expected to generate approximately 19.51 million kWh annually. Phase II is currently under development and will add an additional 5 MW of photovoltaic capacity and 5 MW / 10 MWh of storage, further increasing the share of renewable energy in the park and enhancing supply resilience.

## Case 5

Energy efficiency and resource recovery through extraction–scrubbing circuit optimization at KMSA

KMSA has implemented an extraction–washing circuit upgrade program aimed at reducing limestone and sulfuric acid consumption while maintaining stable production volumes. The project also seeks to minimize metal losses in tailings pond return water, thereby achieving dual benefits in energy efficiency and resource recovery.

Previously, the supernatant liquid from the tailings pond contained relatively high concentrations of copper and cobalt, with approximately 30% settling with tailings. This resulted in significant metal losses and reduced the effective conversion of chemical and energy inputs into productive output. To address this issue, the company reconfigured its process flow from "two-stage extraction, one stripping, and one washing" to "three-stage extraction and one stripping," eliminating the washing stage. In parallel, a dedicated processing line was added for low-concentration solutions, enabling long-term recovery of valuable metals.

Following the upgrade, the quality of raffinate has improved significantly. Acid concentration declined from 23 g/L to 12 g/L, while copper concentration was reduced from 0.8 g/L to 0.4 g/L. System stability has improved, and chemical reagent consumption in the cobalt precipitation and electrowinning stages has decreased substantially.

To date, the project has treated approximately 430,000 cubic meters of low-acid, low-copper raffinate, resulting in cumulative savings of 4,730 tonnes of sulfuric acid and 6,149 tonnes of limestone, and a reduction in copper losses of 172 tonnes. These improvements provide a strong foundation for sustained reductions in material and energy consumption in subsequent years.

With the upgraded production line now integrated into tailings return water treatment, the system is expected to recover approximately 15 tonnes of copper per day. This will further improve direct cathode copper recovery rates, reduce chemical demand and energy consumption per tonne of copper, and enhance water circulation and discharge management.



## Case 6

Integrated photovoltaic and energy storage project at KMSA

To accelerate clean energy substitution at overseas mining operations and reduce reliance on diesel and coal-fired power generation, KMSA is implementing an integrated "solar-plus-storage" power generation project.

The project is designed with a total installed capacity of 20 MW, including battery energy storage systems, and is scheduled for grid connection and commissioning on 10 January 2026. Upon completion, the system will supply stable renewable electricity to core production processes, including hydrometallurgy, electrowinning, and solvent extraction, significantly reducing scope 2 emissions intensity and strengthening long-term clean energy operating capability.

To ensure timely delivery, a modular construction approach has been adopted, with priority given to completing foundations for energy storage systems and transformer substations to facilitate rapid grid connection.

As of the latest reporting period, 9,792 foundation piles (91.34%) have been completed. Installation progress for mounting structures and PV modules has reached 84.7% and 83.88%, respectively. Substation foundations are 80% complete, while energy storage and transformer foundations have been fully completed. Eight prefabricated battery containers and four PCS foundations are in place, and 20 inverters have been installed. Overall project completion stands at approximately 29.85%, with on-site construction progressing steadily.

## Case 7

Waste heat steam recovery and power generation project at Zhonghe Nickel

To improve energy utilization efficiency and reduce losses from steam venting, Zhonghe Nickel has implemented a waste heat steam recovery and power generation project within its smelting system. The project converts medium-pressure steam generated during production into electricity through a screw expander, enabling cascading utilization of residual thermal energy.

The system comprises one screw expander generator unit with a designed steam flow rate of 12 tonnes per hour and an installed capacity of 2,000 kW. The facility occupies an area of approximately 16 × 7.5 meters.

During smelting operations, high-temperature flue gas passes through a waste heat boiler to generate steam. Previously, this steam was released through pressure-reducing valves or condensed and discharged. Under the new system, steam is first routed to the screw expander for expansion and power generation. The remaining steam is then returned to the production system as low-pressure steam.

CTM

# Value chain carbon emissions

# CHAPTER 03

CHENGTUN MINING

## Building value chain competitiveness through supply chain collaboration product decarbonization, and energy transition

In addition to managing carbon emissions from its own operations, the company places strong emphasis on emissions across its value chain. In line with its established decarbonization pathways, the company is actively implementing value chain emissions reduction initiatives. While expanding its industrial footprint, it remains committed to promoting low-carbon development among upstream and downstream partners.

In raw material sourcing and logistics planning, the company systematically evaluates supplier carbon management practices and opportunities for green logistics optimization. These efforts aim to reduce life-cycle carbon intensity and improve overall energy efficiency. Through phased supply chain decarbonization collaboration and forward-looking investment in low-carbon technologies, the company is progressively building a responsible value chain aligned with its 2050 net-zero ambition.


Strategic significance of value chain decarbonization

Overview of the company's scope 3 emissions

Value chain emissions reduction planning and implementation strategy






## 01. Strategic importance of value chain decarbonization

Amid the global transition toward low-carbon development in the metals and mining sector, value chain emissions management has become a defining element of long-term competitiveness. For the company, decarbonizing the value chain is not only aligned with national carbon peaking and carbon neutrality objectives, but also represents a strategic pathway to strengthen supply chain resilience, enhance operational stability, and support sustainable profitability.

The emissions profile of the metals industry is inherently upstream-intensive, with raw material production, energy supply, and transportation accounting for a substantial share of total life-cycle emissions. As such, climate responsibility cannot be limited to direct and indirect emissions within operational boundaries. It must extend across the supply chain and encompass the full value chain.

Given the company's geographically diversified production network, raw material procurement and logistics activities involve significant energy consumption and associated greenhouse gas emissions. Systematic management of scope 3 emissions is therefore essential to achieving the company's net-zero ambition.

Advancing value chain decarbonization strengthens the company's competitive position in three key ways:

- **Supply chain data mapping and transparency:** By identifying and quantifying emissions associated with major raw materials, auxiliary inputs, and related transportation activities, the company develops a structured understanding of its supply chain emissions profile. This enables the identification of high-emission suppliers and supports carbon footprint baseline assessments. Data-driven procurement strategies can then be implemented to encourage suppliers to pursue energy efficiency improvements and energy mix optimization, thereby strengthening climate resilience and supply chain stability.
- **Technology spillover and collaborative mitigation:** Through joint initiatives with suppliers focused on energy structure optimization, fuel substitution, and logistics efficiency, the company seeks to generate collaborative decarbonization effects across the industrial chain and contribute to sector-wide low-carbon transformation.
- **Continuous improvement and capability building:** Building on supply chain carbon management, the company will establish annual carbon data updates and progressively introduce performance evaluation mechanisms that integrate supplier emissions performance into procurement and partnership assessments. Through training programs and joint pilot projects, the company aims to enhance the carbon management capabilities of its partners and transition value chain decarbonization from ad hoc initiatives to a structured, long-term mechanism.

Value chain decarbonization is therefore considered a core component of the company's long-term climate strategy. Continued enhancement of supply chain carbon data management and closer collaboration with key suppliers will lay a systemic foundation for achieving net-zero emissions by 2050.

CARBON EMISSIONS IN THE VALUE CHAIN

# 02. Overview of scope 3 emissions

To ensure scientific rigor and comparability in value chain emissions accounting, the company quantifies scope 3 emissions in accordance with the "GHG Protocol Corporate Value Chain (Scope 3) Standard" and ISO 14064-1:2018.

## Scope 3: Indirect Emissions from the Value Chain

Scope 3 emissions represent indirect greenhouse gas emissions occurring outside the company's operational boundaries as a result of upstream and downstream activities across the value chain. These include emissions from purchased goods and services, capital goods, energy-related upstream activities, logistics, waste treatment, business travel, product distribution, and other investment-related activities.

For the company, scope 3 emissions are primarily concentrated in upstream raw material production, energy supply chains, and logistics. Managing these emissions is critical to understanding the structural carbon intensity of the value chain and enabling coordinated low-carbon transformation.





| Category | Scope 3category | Description | Company-specific examples |
|---|---|---|---|
| **Upstream emissions** | | | |
| 1 | Purchased goods and services | Emissions generated by suppliers during the production of raw materials, auxiliary materials, chemicals, and packaging | All facilities procure large volumes of raw and auxiliary materials whose upstream production involves substantial energy and material consumption, resulting in greenhouse gas emissions |
| 2 | Capital goods | Emissions from the construction, expansion, or renovation of facilities and from equipment manufacturing | Smelter expansion projects, mining equipment procurement, and infrastructure investments, all of which involve energy- and material-intensive upstream production |
| 3 | Fuel- and energy-related activities | Emissions from the extraction, processing and transportation of purchased electricity and fuels | Extraction and transportation of purchased electricity, coal, and natural gas involve significant energy use and associated emissions |
| 4 | Upstream transportation and distribution | Emissions from the transportation of raw materials, fuels, and intermediate products | Maritime and road transportation of raw and auxiliary materials, involving energy consumption and related emissions |
| 5 | Waste generated in operations | Emissions from the treatment of slag, waste acid, and packaging waste generated during operations | General solid waste, industrial waste, and hazardous waste are treated by third parties with emissions arising from both treatment and transportation |
| 6 | Business travel | Emissions from employee business travel | Non-material scope 3 category |
| 7 | Employee commuting | Emissions from employee commuting | Non-material scope 3 category |
| 8 | Upstream leased assets | Emissions from leased facilities, equipment, or sites | Not applicable |
| **Downstream emissions** | | | |
| 9 | Downstream transportation and distribution | Emissions from transportation and warehousing of products delivered to customers | Maritime and road transportation of products, involving energy consumption and related emissions |
| 10 | Processing of sold products | Emissions from customers' processing of sold products | Non-material scope 3 category |
| 11 | Use of sold products | Emissions arising during the use phase of sold products | Non-material scope 3 category |
| 12 | End-of-life treatment of sold products | Emissions from recycling or disposal of products at end of life | Non-material scope 3 category |
| 13 | Downstream leased assets | Emissions from assets leased to third parties | Not applicable |
| 14 | Franchises | Emissions from franchised operations | Not applicable |
| 15 | Investments | Emissions from equity investments, joint ventures, and investment projects | Not applicable |

## Overall emissions profile

In the 2024 base year, the company's total scope 3 greenhouse gas emissions amounted to 4,663,439 tonnes of carbon dioxide equivalent ($tCO_2e$).

Scope 3 emissions are mainly driven by purchased raw materials, upstream energy production, and transportation activities. As the company's smelting and downstream processing operations require substantial inputs of raw and auxiliary materials, the production and supply of purchased materials represent the largest source of value chain emissions.

In addition, certain raw materials and intermediate products involve intercontinental transportation. Long transport distances and high energy consumption further increase indirect emissions from upstream and downstream logistics. Moreover, the company's operations rely heavily on coal, natural gas, and diesel. Upstream emissions associated with the extraction, processing, and transportation of these energy sources also account for a significant share of total scope 3 emissions.

Overall, the company's scope 3 emissions profile is characterized by high dependence on external raw materials, long transportation distances, and a large proportion of upstream energy-related emissions. These areas therefore represent key priorities for supply chain collaboration and energy structure optimization.

To ensure the scientific rigor of scope 3 emissions accounting, the company has established internal materiality assessment criteria in accordance with the "GHG Protocol Corporate Value Chain (Scope 3) Standard" and ISO 14064-1:2018. The materiality framework considers the following evaluation dimensions:

| Evaluation indicator | Description | Scoring method |
|---|---|---|
| Emissions magnitude | Share of total company emissions | High (5) / Medium (3) / Low (1) |
| Degree of influence | Company's ability to control or influence the source | Direct (5) / Indirect (3) / Limited (1) |
| Risk exposure | Level of compliance, reputational, market, or supply chain risk | High (5) / Medium (3) / Low (1) |
| Data availability | Availability of reliable data for calculation | Sufficient (5) / Partial (3) / Limited (1) |
| Data accuracy | Data quality, consistency, and applicability of emission factors | High (5) / Medium (3) / Low (1) |
| Stakeholder concern | Level of attention from customers, regulators, and investors | High (5) / Medium (3) / Low (1) |
| Degree of outsourcing | Extent of third-party involvement increasing indirect emissions | High (5) / Medium (3) / Low (1) |
| Industry guidance | Coverage in sector standards or peer disclosures | Required (5) / Recommended (3) / Not required (1) |

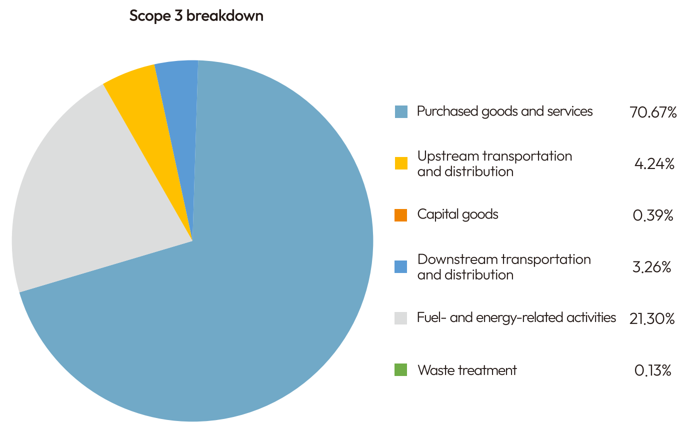
Based on the company's Material Indirect Emission Source Assessment Framework, a materiality assessment was conducted across all 15 scope 3 categories. Each category was evaluated using quantitative scoring across eight dimensions, including emissions magnitude, business relevance, data availability, and stakeholder concern. Based on this assessment, the following categories were identified as material scope 3 emission sources:

| No. | Material emission category | Rationale |
|---|---|---|
| 1 | Purchased goods and services | A high proportion of production inputs; the primary source of value chain emissions; strong data availability and material impact on overall carbon intensity |
| 2 | Capital goods | Frequent investment in facilities, equipment, and infrastructure; high carbon intensity in the production of steel, cement, and other capital goods |
| 3 | Fuel- and energy-related activities | Significant upstream emissions from the extraction, processing, and transportation of coal, natural gas, and electricity; a major component of indirect emissions |
| 4 | Upstream transportation and distribution | Long-distance cross-regional transportation of raw materials and fuels, particularly maritime shipping of overseas materials |
| 5 | Downstream transportation and distribution | Emissions from maritime and road transportation of products, involving substantial energy consumption |
| 6 | Waste treatment | Emissions from third-party treatment and transportation of general, industrial, and hazardous waste generated during operations |





| Emission source | Emissions($tCO_2e$) |
|---|---|
| Purchased goods and services | 3,295,653 |
| Capital goods | 18,355 |
| Fuel- and energy-related activities | 993,429 |
| Upstream transportation and distribution | 197,534 |
| Downstream transportation and distribution | 152,244 |
| Waste treatment | 6,224 |
| Total | 4,663,439 |




The company places strong emphasis on the accuracy and consistency of its scope 3 greenhouse gas emissions data. All subsidiaries collect activity data related to procurement, energy use, transportation, and waste management in accordance with unified accounting methodologies and standardized reporting templates. The data are subject to centralized review and cross-checking procedures to ensure authenticity of sources, clarity of boundaries, and consistency of calculation approaches.

Overall, the current scope 3 emissions data provide a reasonable representation of the company's value chain carbon structure and relative emissions intensity. As supplier carbon disclosure and data-sharing mechanisms continue to improve, the company will further enhance the coverage and precision of data collection, strengthen verification and update processes, and continuously improve the robustness and reliability of its scope 3 emissions accounting.

- **Product carbon footprint**

Against the backdrop of accelerating global energy transition and the growing emphasis on low-carbon supply chains, product-level carbon emissions have become a key indicator of competitiveness in the metals industry. As downstream battery manufacturers, automotive companies, and technology firms increasingly set explicit decarbonization requirements, higher standards are being imposed on the transparency and carbon intensity of nickel, cobalt, copper, and other intermediate metal products. Companies are therefore required to quantify and substantiate the carbon intensity of their products on a per-unit basis.

To further identify emission hotspots across the value chain and assess evolving low-carbon requirements from downstream customers, the company has carried out carbon footprint assessments for its major products. These assessments are conducted in accordance with ISO 14067 and cover the "cradle-to-gate" life cycle, from raw material sourcing and transportation to production and processing.

Product carbon footprint analysis is not an isolated tool, but rather a product-level allocation of scope 1, scope 2, and scope 3 emissions. Accordingly, carbon footprint results represent a more granular breakdown of certain scope 3 emissions, as well as a product-based reflection of scope 1 and scope 2 emissions. These results serve as an important basis for identifying transition risks and opportunities and for formulating key decarbonization measures, including renewable electricity substitution, supply chain optimization, and transport emissions reduction.

| Life cycle stage | Corresponding scope | Category | Source of emissions | Relevance to value chain decarbonization |
|---|---|---|---|---|
| Raw material sourcing | Scope 3 | Purchased goods and services | Purchased ores, intermediates, and chemicals already embed upstream smelting and energy emissions | Primary driver of carbon footprint for downstream products (e.g., cobalt tetroxide, nickel matte, nickel sulfate); key focus area for supply chain decarbonization |
| Raw material transportation | Scope 3 | Upstream transportation | Road and maritime transport from suppliers to production sites | Transport optimization can significantly reduce energy use and logistics-related emissions |
| Product manufacturing | Scope 1 | Direct fuel combustion and process emissions | Combustion of coal, diesel, heavy fuel oil, and natural gas in smelting processes | Fuel substitution and furnace upgrades directly reduce scope 1 emissions and manufacturing-related footprint |
| Product manufacturing (purchased electricity) | Scope 2 | Purchased electricity | Indirect emissions from externally sourced electricity | Renewable electricity procurement and distributed PV directly reduce scope 2 and product carbon intensity |
| Upstream energy emissions | Scope 3 | Fuel- and energy-related activities | Extraction, processing, and transport of coal, oil, gas, and electricity | Affects manufacturing footprints across all products; critical for energy-intensive operations |
| Production waste treatment | Scope 3 | Waste generated in operations | Treatment of slag, residues, and sludge | Improved recycling and waste management reduce life-cycle emissions |
| Product transportation | Scope 3 | Downstream transportation | Transport from plants to customer warehouses or ports | Mode optimization, higher load factors, and greater use of shipping can deliver significant reductions |
| Downstream processing | Scope 3 | Processing of sold products | Further smelting, refining, or synthesis by customers | Lower product carbon intensity reduces downstream processing emissions and enhances competitiveness |
| Use phase | Scope 3 | Use of sold products | Energy use or emissions during product use | Typically limited for metal materials |
| End-of-life treatment | Scope 3 | End-of-life | Recycling, re-smelting, or landfill disposal | Circular recycling systems reduce end-of-life emissions |

In 2025, the company conducted carbon footprint assessments and third-party verification for its major products, including crude cobalt hydroxide, cathode copper, cobalt tetroxide, nickel sulfate, and nickel matte.Through detailed data analysis, the company identified the emissions contribution of each life cycle stage. The results show that a product's position within the value chain largely determines its carbon footprint structure. Differences in footprint profiles among products arise from their distinct roles within the copper-cobalt-nickel industrial chain.These structural differences provide a fundamental basis for value chain decarbonization strategies.

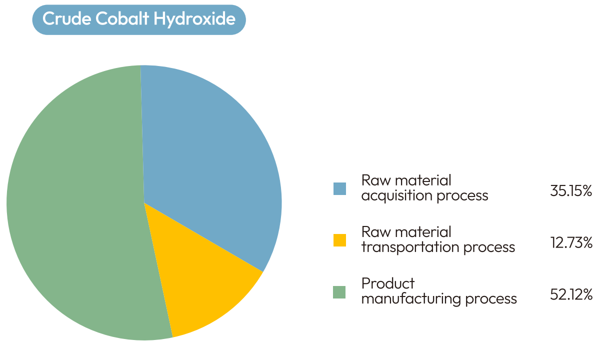
- **Crude cobalt hydroxide and cathode copper**

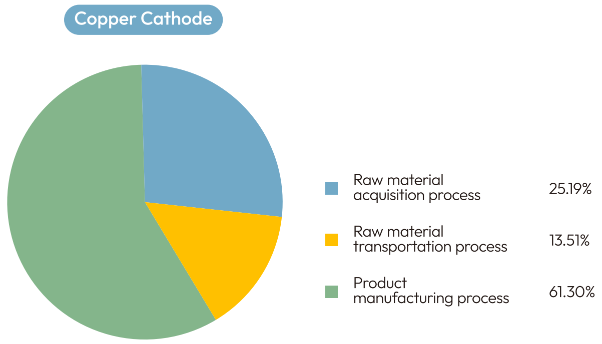
Crude cobalt hydroxide and part of the company's cathode copper production are derived from copper–cobalt smelting operations at KMSA, CCR, and CCM.

These products are relatively close to their natural ore origins. Their upstream life cycle stages are comparatively simple and mainly include mining, beneficiation, and primary smelting. As the ores have not undergone multiple processing stages, the intermediate processing chain is relatively short, and upstream pre-processing emissions remain limited.

At the same time, energy consumption is highly concentrated in the manufacturing stage. As a result, production-related emissions account for more than 50% of the total carbon footprint of these products, with cathode copper exceeding 60%.

Positioned at the upstream end of the company's value chain, the carbon footprint of these products is primarily driven by smelting energy consumption. Accordingly, decarbonization efforts for these products focus on improving energy efficiency and reducing emissions in core production processes.



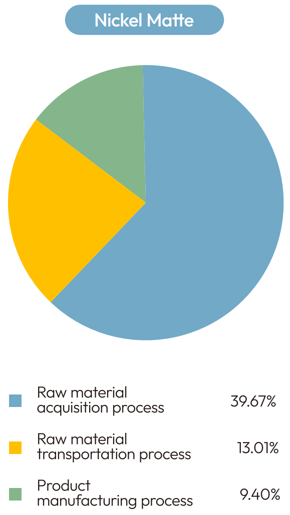



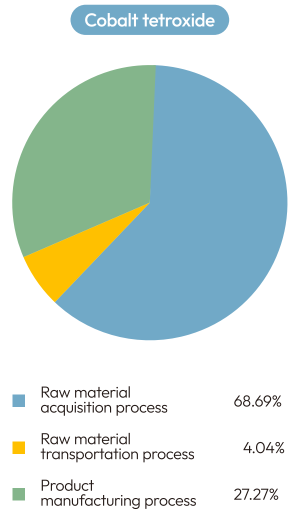

## Cobalt tetroxide, nickel matte, and nickel sulfate

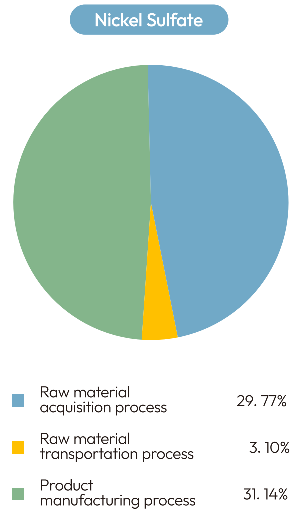
Cobalt tetroxide, nickel matte, and nickel sulfate are positioned further downstream in the company's smelting and deep processing operations. Unlike upstream products that are more closely linked to natural ores, these products are typically manufactured using multiple intermediates, precursors, or externally sourced smelting materials.

As these products are located at the later stages of the industrial chain, their input materials have already undergone several energy-intensive smelting and processing steps. As a result, substantial carbon emissions are embedded in upstream processing stages, leading to a significantly higher share of emissions attributable to raw material sourcing.

Accordingly, for products at the deep processing stage, emissions from raw material acquisition represent a larger proportion of the overall carbon footprint. The company's primary decarbonization focus for these products is therefore centered on strengthening supply chain management and advancing coordinated scope 3 emissions reduction initiatives with upstream partners.




- **Summary**

Differences in the carbon footprint structures of the company's products are closely linked to their respective positions within the industrial value chain. Products such as crude cobalt hydroxide and primary cathode copper are derived from initial smelting at the company's own mining operations. As they are close to natural ores and involve relatively short upstream processing chains, emissions from raw material sourcing account for a smaller share of their overall carbon footprint. Instead, emissions are primarily concentrated in the energy and fuel consumed during production.

In contrast, downstream processed products such as cobalt tetroxide, nickel matte, and nickel sulfate rely heavily on externally sourced intermediates that have already undergone energy-intensive processing. This results in significantly higher emissions associated with raw material acquisition, making it the dominant contributor to their value chain carbon footprint.

This structural divergence clearly defines differentiated value chain decarbonization pathways. For upstream mining-related products, emissions reduction efforts should focus on improving plant energy efficiency and optimizing energy structures. For downstream deep-processing products, effective decarbonization depends on strengthened supply chain management, carbon intensity screening of raw materials, and the promotion of low-carbon practices among upstream suppliers.

Product carbon footprint analysis remains the most effective tool for identifying value chain emission hotspots and will continue to guide the company's scope 3 mitigation strategies across all relevant categories.

# 03. Approach to reducing value chain carbon emissions

Unlike scope 1 and scope 2 mitigation efforts, which primarily focus on improving internal energy efficiency and optimizing electricity consumption structures, scope 3 emissions reduction targets the entire life cycle of the value chain through coordinated action.

Scope 1 and scope 2 reductions are mainly achieved through internal technological upgrades, energy substitution, and operational efficiency improvements. In contrast, scope 3 mitigation relies on external collaboration and is driven by supplier management, green procurement, logistics optimization, and upstream energy decarbonization. As such, scope 3 mitigation places greater emphasis on cross-organizational coordination, data transparency, and the extension of corporate influence across the value chain.

The company's scope 3 emissions are mainly derived from purchased raw materials, upstream energy-related activities, and transportation. This results in a structural profile characterized by high dependence on external materials, long transportation distances, and a large share of indirect energy-related emissions. In response, the company's scope 3 mitigation strategy centers on supply chain collaboration and data-driven management, with a focus on improving supplier carbon performance, optimizing logistics structures, and promoting low-carbon energy adoption. Through these efforts, the company is progressively building a systematic decarbonization pathway covering major value chain nodes.

The overall approach includes the following three aspects:

- **Supply chain carbon data mapping and capability building**

The company has identified the development of a robust supply chain carbon data system as the primary foundation of its scope 3 mitigation efforts. Through supplier questionnaires, standardized data submissions, and targeted supplier interviews, the company is gradually establishing an understanding of the carbon intensity of purchased materials. This provides essential data support for future mitigation planning.

At the same time, the company is developing supplier carbon management capability assessment mechanisms to encourage key partners to conduct carbon inventories and implement energy efficiency improvements.

- **Upstream collaborative mitigation and logistics optimization**

By working closely with major raw material suppliers, the company seeks to advance joint initiatives in energy efficiency upgrades, clean energy substitution, and transport route optimization. These efforts aim to reduce indirect emissions associated with material production and long-distance transportation.

Priority actions include encouraging suppliers to adopt low-carbon fuels, promoting consolidated logistics and multimodal transport solutions, and exploring green transport mechanisms in cooperation with logistics service providers.

- **Energy structure optimization and reduction of indirect emissions**

Given the high proportion of upstream energy-related emissions, the company will prioritize indirect emissions reductions through energy structure adjustment and fuel substitution. On the supply side, this includes gradually reducing reliance on coal-fired electricity and boilers in favor of cleaner and more efficient energy sources. On the demand side, the company will promote diesel substitution and equipment electrification in transportation and operations.

In parallel, renewable electricity procurement and renewable certificate mechanisms will be introduced in phases to increase the share of green energy. Through these structural adjustments, the company aims to reduce operational emissions while also lowering the embedded carbon footprint of its energy supply chain, enabling coordinated progress in scope 2 and scope 3 decarbonization.

At present, the company's scope 3 mitigation efforts remain at the stage of system development and strategic planning, and large-scale supply chain decarbonization projects have not yet been fully implemented. However, with the gradual improvement of carbon data systems and clearer identification of value chain emission structures, scope 3 mitigation has been established as a strategic priority within the company's long-term climate framework, supported by systematic medium- and long-term planning.

The company recognizes that the core challenges of scope 3 mitigation lie in cross-organizational coordination and limited data transparency. Accordingly, its strategy does not rely solely on supplier-driven emission reductions. Instead, the company is establishing a unified carbon management framework and shared data mechanisms to foster long-term, sustainable low-carbon partnerships across the supply chain.





## Phased roadmap for scope 3 emissions reduction

### 01 System development and baseline assessment (2025–2027)

The company will begin by strengthening supply chain carbon data mapping and improving standardized data collection templates for procurement, energy, and logistics activities. A company-wide scope 3 emissions database will be progressively established.

In parallel, carbon performance assessments will be conducted for key suppliers, and a tiered management mechanism will be introduced to identify high-emission and high-dependency segments. The primary objective at this stage is to establish a clear emissions baseline and a solid data foundation to support future mitigation pathways.

### 02 Collaborative mitigation and mechanism development (2028–2035)

Following completion of baseline assessments, the company will gradually implement collaborative supply chain decarbonization initiatives, including:

- Setting carbon performance requirements for major raw material and energy suppliers and prioritizing the procurement of low-carbon products and energy sources;
- Promoting the use of clean fuels, route optimization, and improved load efficiency in raw material and intermediate product transportation;
- Establishing green procurement qualification systems that integrate supplier carbon management capabilities into procurement and performance evaluation frameworks.

### 03 Net-zero transition (2035–2050)

In the long term, supported by mature carbon data systems and established supply chain collaboration mechanisms, the company will progressively advance value chain-wide decarbonization and net-zero transition.

During this phase, the company will further strengthen deep cooperation with upstream and downstream partners and jointly develop long-term emissions reduction targets and action plans, forming quantifiable and traceable value chain mitigation pathways.

Key focus areas will include:

- **Joint value chain decarbonization targets:** collaborating with major suppliers and logistics partners to align decarbonization efforts across production processes, energy structures, and logistics systems;
- **Low-carbon technology collaboration and green investment:** promoting the deployment of new energy smelting technologies, clean fuels, renewable energy, and carbon capture, utilization, and storage (CCUS) through capital investment, technical partnerships, and industry alliances.

Overall, the company's scope 3 mitigation strategy follows a three-step pathway of "baseline establishment, collaborative mitigation, and value chain net zero." This approach is aligned with current data readiness while laying a solid foundation for long-term enhancement of supply chain carbon management capabilities.

The company recognizes that value chain decarbonization is a complex and systemic undertaking involving challenges related to data transparency, technological feasibility, and partner engagement. It remains committed to continuously improving its scope 3 management framework by adopting more rigorous accounting methodologies and mitigation strategies, drawing on international best practices and industry experience.

# Climate physical risks and response measures

# CHAPTER 04

CHENGTUN MINING

## Building corporate resilience under a 1.5°C warming scenario

We are conducting assessments to evaluate the climate-related physical risks that each operating site has already faced and may face in the future, in order to develop response measures that ensure all facilities can continue to operate safely and sustainably under evolving climate conditions.

- Methodologies for identifying, validating, and analyzing climate physical risks
- Climate physical risk analysis
- Case studies of response measures



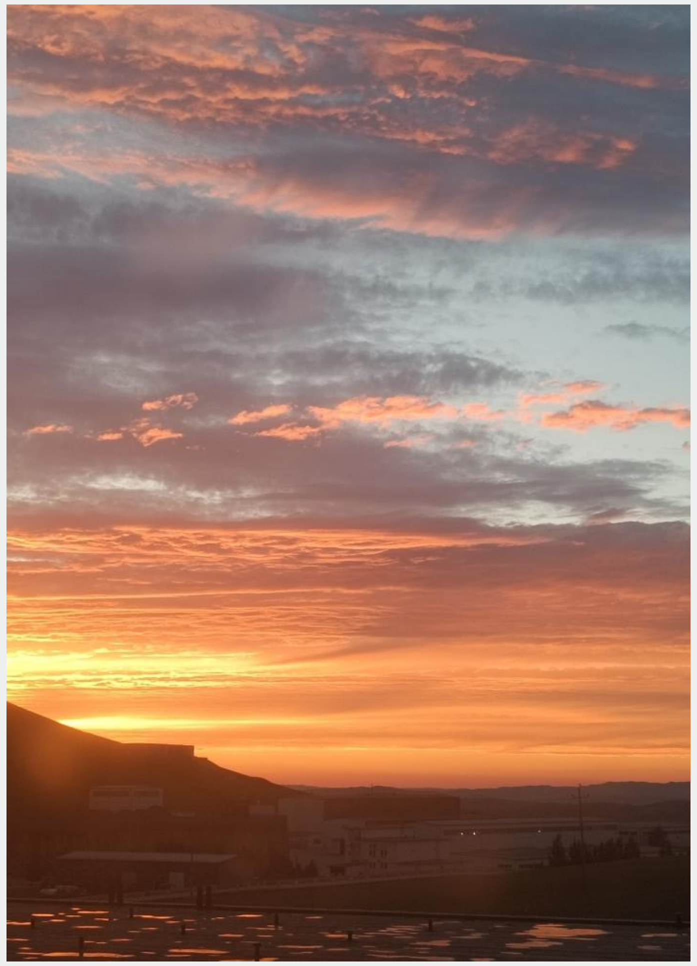


The year 2024 was officially confirmed as the hottest year on record. Global mean surface temperature was approximately 1.55°C above the pre-industrial baseline (1850–1900), marking the first year in recorded history in which annual average temperature exceeded the 1.5°C threshold

This warming trend reflects more than natural variability. The extreme heat observed in 2024 was primarily driven by a persistent El Ni�o event, compounded by the long-term effects of anthropogenic greenhouse gas emissions. Atmospheric carbon dioxide concentrations reached their highest level in the past 800,000 years. Ocean heat content has set new records for eight consecutive years, absorbing more than 90% of the excess heat accumulated globally. Glaciers and polar ice sheets are melting at accelerating rates. Arctic sea-ice extent has remained at historically low levels for 18 consecutive years. The global average sea-level rise rate has increased from 2.1 mm/year in 1993 to 4.7 mm/year.

Accordingly, we are proactively identifying and assessing the major physical climate risks across our operating locations, establishing resilience-enhancement plans based on climate scenario analysis, and integrating adaptation into facility management, supply-chain configuration, and long-term strategic planning.

CLIMATE-PHYSICAL RISKS AND
RESPONSE METHODS



# 01. Methodology for identification and assessment of climate physical risks

Due to climate change, some of our sites have already experienced climate-related stressors such as debris flows triggered by heavy rainfall, increasingly frequent super typhoons, and water shortages caused by drought. We must test our resilience and prepare adaptive responses to ensure operational safety, sustained productivity, and value-chain reliability

## Definition of climate physical risks

Physical risks refer to risks arising from environmental changes or extreme weather events driven by climate change that may directly or indirectly affect a company's assets, operations, employees, supply chains, and surrounding communities. These risks are classified into acute and chronic physical risks according to timescale.

**Acute physical risks** Sudden, short-duration, high-intensity events that may result in facility damage, operational disruption, transport delays, or casualties. Examples include extreme heat, heatwaves, intense rainfall, flash floods, typhoons, debris flows, landslides, and wildfires.

**Chronic physical risks** Gradual, long-term climatic shifts that may cause persistent impacts such as reduced productivity, increased resource costs, or asset impairment. Examples include rising average temperatures, altered precipitation patterns, long-term water scarcity, sea-level rise, and ecosystem degradation.

As global temperatures rise, some regions face increasing drought risk, while certain coastal regions face sea-level rise and more frequent typhoons. Because our operations and supply chains span multiple countries and regions with differing geographic, climatic, and socio-economic conditions, we are exposed to both acute and chronic physical risks. To comprehensively identify these risks and develop scientifically robust adaptation strategies, we have established an assessment methodology integrating global climate scenario modelling with regional meteorological risk characteristics.





## Climate risk assessment approach

This methodology combines scenario projections based on outputs from Global Climate Models (GCMs) with assessments of exposure, vulnerability, and adaptive capacity for each operating site and key facility. We apply a dual-track framework integrating top-down and bottom-up approaches.

**Top-down analysis:** Relies primarily on global climate models and Shared Socioeconomic Pathways (SSPs) from the IPCC Sixth Assessment Report to derive long-term regional projections of key climate variables (such as temperature and precipitation) under different scenarios.

**Bottom-up analysis:** Integrates site-specific factors including geographic location, historical meteorological records, existing response capacity, infrastructure sensitivity, and external exposure (e.g., landslide-prone zones or typhoon corridors) to identify actual operational risks and response capability gaps.

By combining bottom-up findings on real site exposure with top-down projections of hazard intensity under different climate scenarios, we assess each site's future exposure to climate physical risks.

**Climate Modelling**

To conduct physical climate risk assessment, we analyzed outputs from global climate models under SSP pathways presented in the IPCC Sixth Assessment Report. We selected gridded meteorological variables (e.g., temperature and precipitation) under three scenarios: SSP1-2.6, SSP2-4.5, and SSP5-8.5.

For this initial analysis, we used CMIP6 climate datasets and applied statistical downscaling techniques with bias correction using climate databases. Because most of our sites historically did not record local meteorological observations such as precipitation, daily maximum temperature, or daily minimum temperature, we will continue monitoring on-site climate conditions to improve the local applicability of projections.

The climate dataset used includes baseline data for 1995–2014, which are used to project conditions for 2025–2050.

**Historical Investigation**

In addition to model-based analysis, we conducted site visits and interviews to document actual climate-related disasters experienced at each facility, such as debris flows caused by prolonged rainfall, super typhoons damaging equipment and power lines, extreme cold causing road icing and transport disruption, and extreme precipitation leading to road collapse and logistical interruption. These historical observations, combined with climate model outputs, allow us to assess future disaster frequency and severity.

**Figure 1: Methodological Framework for Climate Physical Risk Analysis**

Climate data projection model: Utilizes climate modeling to analyze changes in specific climate parameters under different climate scenarios

Historical and current site assessment: Conduct site visits to each operational location to investigate past climate-related events and identify existing or planned adaptation measures.

Quantifying climate risk through financial metrics: Integrate climate risks into financial models to assess their potential impact on financial performance.

Integrating climate action into corporate strategy: Embed climate change considerations into future strategic planning to ensure climate risks are minimized across business operations.

Through this methodology, we systematically identify the following categories of physical climate risks, including but not limited to: Extreme heat;Extreme cold;Drought and water stress;Heavy rainfall;Typhoons;Debris flows Coastal erosion driven by sea-level rise.

The framework also provides foundational data for assessing secondary risks such as supply-chain disruption, operational downtime, occupational health hazards, and instability in resource availability.

**Table 1. Comparison of Major Climate Scenarios**

| Scenario | Description | Core Assumptions | Global Warming by 2100 | Emissions Pathway | Energy & Policy Features | Physical Risk Implications |
|---|---|---|---|---|---|---|
| SSP1-2.6 | Sustainability pathway (low emissions) | Rapid global transition; renewable substitution; strong cooperation; strict mitigation | 1.8°C | Rapid decline after 2020; net-zero before 2050 | High renewable share; rapid fossil decline; high carbon price | Limited increase in extremes; most risks manageable though regional challenges remain |
| SSP2-4.5 | Intermediate pathway | "Status quo" development; partial mitigation | 2.7°C | Stabilisation around 2050 then gradual decline | Diversified energy mix; fossil fuels remain significant | Extreme climate increases markedly; both physical and transition risks moderate-to-high |
| SSP5-8.5 | Fossil-fuel intensive pathway | Rapid economic growth; continued reliance on coal, oil and gas | 4.4°C | Emissions continue rising to 2100 | Fossil fuels dominant; weak mitigation policy | Extreme events intensify significantly; highest physical risk |

# 02. Climate Physical Risk Analysis

## Potential Physical Risks and Impacts

Table 2: Overview of Potential Impacts of Physical Climate Risks on Operations and Financial Performance

| Types of physical climate risks | Identification method | Operational risks | Financial risks |
|---|---|---|---|
| Extreme Heat | Using ERA5 data from 1995–2014, the 90th percentile (P90) of daily maximum temperatures is calculated as the threshold. After bias correction with CMIP6 scenario data, the number of days exceeding this threshold is projected for future periods. | Increased employee health and safety risks | Higher energy consumption and maintenance costs |
| | | Reduced production efficiency | Revenue losses resulting from production interruptions and efficiency declines |
| | | Increased load on equipment and power systems infrastructure | Additional capital investment required to upgrade cooling and safety infrastructure |
| | | Increased demand for cooling water | |
| Extreme Cold | Using ERA5 data from 1995–2014, the 10th percentile (P10) of daily minimum temperatures is calculated as the threshold. After bias correction with CMIP6 scenario data, the number of days below this threshold is projected for future periods. | Increased vulnerability of equipment and infrastructure | Higher energy consumption and maintenance costs |
| | | Road and transportation disruptions | Revenue losses due to production interruptions and reduced efficiency |
| | | Increased load on the power system | Additional capital investment required to upgrade facilities |
| Extreme precipitation | Using ERA5 precipitation data from 1995–2014, the maximum single-day rainfall (R1X) and maximum five-day cumulative rainfall (R5X) are calculated as baseline thresholds. After bias correction with CMIP6 scenario data, changes in the intensity and frequency of extreme rainfall events are assessed for future periods. | Water accumulation at mining and smelting sites | Production losses and reduced sales revenue |
| | | Overflow or instability of pits and tailings dams | Increased operational expenditures |
| | | Overloaded drainage systems | Additional capital investment required to reinforce tailings dams and drainage infrastructure |
| | | Roads and external transportation routes | |
| Drought and water stress | Using ERA5 data from 1995–2014, the distribution of consecutive dry days (CDD, typically defined as days with precipitation <1 mm) is calculated as the baseline threshold. After bias correction with CMIP6 scenario data, changes in the frequency and duration of drought events are assessed for future periods. | Insufficient process water | Additional investment required to build water treatment and conservation facilities |
| | | Excessive groundwater extraction | Reduced production and revenue |
| Severe typhoons | Typhoon risk is identified based on whether a facility is located within the Western Pacific typhoon impact zone. For example, the Yangjiang and Zhuhai plants are classified as potentially exposed assets due to their location in a high-frequency typhoon area. | Damage to smelter infrastructure | Significant repair and reconstruction costs |
| | | Personnel safety and supply chain disruptions | Production losses and decreased revenue |
| | | Power outages | Additional capital investment to reinforce storage and critical production facilities |
| | | Government-mandated shutdowns | Reduced production and revenue |
| Landslides | Using ERA5 precipitation data from 1995–2014, the maximum five-day cumulative rainfall (R5X) is calculated as the baseline threshold. After bias correction with CMIP6 scenario data, changes in the intensity and frequency of extreme rainfall events are assessed for future periods. | Damage to on-site roads | Facility repair and remediation costs |
| | | Damage to production facilities | Production losses impacting revenue |
| | | Serious threats to employee safety | Additional capital required for slope stability monitoring and protective engineering |
| Sea level rise | Identification method for sea level rise: Use NASA's IPCC AR6 sea level projection tool to obtain projected sea level increases under different SSP scenarios, and overlay these projections with the geographic location and elevation of coastal assets to assess potential inundation and compound storm surge risks. | Flooding and corrosion risks to coastal smelters, ports, and transportation infrastructure | Long-term capital expenditures for facility upgrades and coastline restoration |
| | | Disruptions to raw material and product import/export routes | Production delays, inventory buildup, and reduced revenue |
| | | High tide combined with storm surge exacerbates flooding risks at the facility. | |
| | | Critical power and communication infrastructure at risk | |





## Physical Risk Analysis Results

Table: Overview of Measures to Address Physical Climate Risks

| Climate hazard category | Climate scenario & trend | Timing of impact | Magnitude of impact |
|---|---|---|---|
| Extreme Heat | Model projections indicate that, between 2015 and 2050, the number of high-temperature days (>35˚C) at our assets varies significantly across emission scenarios. Under the low-emission scenario (SSP1-2.6), most sites experience an average of 8–18 high-temperature days per year, with Zhonghe Nickel being the most exposed, averaging up to 26 days annually. Under the medium-emission scenario (SSP2-4.5), high-temperature days increase to 12–22 days for most sites, with Zhonghe Nickel reaching 37 days. The high-emission scenario (SSP5-8.5) presents the most severe conditions, with Zhonghe Nickel averaging 48 high-temperature days per year, while other sites generally remain under 25 days. This trend indicates that, without effective global greenhouse gas mitigation, certain smelters and mines will face prolonged and frequent exposure to extreme heat, posing substantial operational and safety challenges. | Short, medium, and long term | High |
| Extreme Cold | Model projections indicate that extreme low-temperature events at our operational sites are generally limited, with an average of only 3–5 days per year below 0 C˚ between 2015 and 2050. Chengtun Zinc & Germanium experiences slightly higher counts under SSP2-4.5 and SSP5-8.5 (around 5 days), while Chengtun Zinc & Germanium and Zhonghe Nickel remain roughly at 3–4 days. Overall, the risk from low temperatures is comparatively minor relative to heatwaves and heavy rainfall; however, in certain years, it may still lead to localized facility icing, transport disruptions, or equipment damage, posing challenges to smelting and logistics operations. | Short-term | Low |
| Extreme precipitation | Model results indicate that, compared with the baseline period, the maximum single-day precipitation (R1Xday) at our operational sites is generally projected to increase between 2025 and 2050. Under the high-emission scenario SSP5-8.5, KMSA, CCR, and CCM are expected to experience the largest increases in R1Xday, reaching 14–15%, significantly raising the risk of flooding and tailings dam instability in the mining areas. Chengtun Energy Metal, Chengtun Zinc & Germanium and Zhonghe Nickel are projected to see increases of 6–9% under SSP5-8.5, while Kelixin (Zhuhai) and Kelixin (Yangjiang) show little change under low-emission scenarios but rise to 6–7% under SSP5-8.5. Youshan Nickel exhibits the smallest changes, with a slight decrease under SSP1-2.6. The maximum five-day consecutive precipitation (RX5day) for KMSA, CCR, and CCM could increase by up to 9.2% under SSP5-8.5, while Chengtun Zinc & Germanium shows increases of 3.8–7.1% across scenarios. Overall, KMSA, CCR, CCM, and Chengtun Zinc & Germanium may face more frequent prolonged heavy rainfall events in the medium term, posing significant pressure on tailings dams, slope stability, and drainage systems. | Short, medium, and long term | Extremely high |
| Drought and water stress | Model projections indicate that between 2025 and 2050, the number of consecutive dry days (CDD) at our facilities is generally increasing, with the most pronounced rise under the high-emission scenario SSP5-8.5. Under SSP5-8.5, Chengtun Energy shows a CDD increase of 12.9%, reflecting a clear trend of worsening drought; Zhonghe Nickel rises by 12.3%, and Kelixin (Yangjiang) by 11.3%, all exceeding 10%, indicating significant mid-term extreme drought risk. Youshan Nickel and our subsidiaries in the Congo (KMSA, CCR, and CCM) also show increases of 10% and 8.5%, respectively, under SSP5-8.5. Even under the lower-emission scenario SSP1-2.6, most sites still experience a 2–7% increase in CDD. Overall, drought and water stress are projected to intensify over the medium to long term, posing challenges for smelter cooling water, mining operations, and shared community water resource management. | Short, medium , and long term | High |
| Severe typhoons | Kelixin (Zhuhai) and Kelixin (Yangjiang) are both located within the high-frequency typhoon impact zone along the South China coast. In 2025, Typhoon "Huajiasha" made landfall in Yangjiang, causing partial equipment damage and production stoppages at Kelixin (Yangjiang), while Kelixin (Zhuhai) also experienced facility damage. This event highlights the existing vulnerability of the sites to severe typhoons. Under future SSP2-4.5 and SSP5-8.5 scenarios, similar intense typhoon events are expected to pose an increased risk of widespread facility damage, port closures, and production interruptions. | Short, medium , and long term | High |
| Landslides | As Chengtun Zinc & Germanium is the only facility located in a high landslide risk area, this risk analysis focuses solely on it. Between 2025 and 2050, the maximum five-day consecutive rainfall (RX5) at the site shows an overall increasing trend. Under the low-emission scenario SSP1-2.6, RX5 is projected to increase by 3.8%, while under SSP5-8.5 it could rise by 7.1%, indicating a significant intensification of prolonged rainfall and a corresponding increase in landslide risk. | Short, medium , and long term | Extremely high |
| Sea-Level Rise | Based on projections from NASA AR6, our facilities in South China—Kelixin (Zhuhai) and Kelixin (Yangjiang), as well as Youshan Nickel—are expected to face progressively increasing risks from sea level rise in the future. Under a low-emission scenario (SSP1-2.6), sea levels are projected to rise approximately 0.16–0.21 meters by 2050 and 0.36–0.47 meters by 2100. Under a medium-emission scenario (SSP2-4.5), the projected increase is around 0.17–0.22 meters by 2050, reaching 0.50–0.61 meters by 2100. Under a high-emission scenario (SSP5-8.5), sea levels could rise 0.20–0.25 meters by 2050 and 0.72–0.82 meters by 2100. Overall, these projections indicate that while short- to medium-term exposure for these assets remains limited, they are likely to face heightened risks over the long term. | long term | Low |

In this assessment, we conducted a preliminary estimation of the current and potential future financial impacts of debris flows and severe typhoons by integrating observed historical events with climate scenario modeling. Using the 2023 landslide incident at Chengtun Xinzhe and the 2025 "Huajiasha" typhoon in Yangjiang as reference cases (see case study section), we performed targeted quantitative analysis based on historical loss data, frequency trends, and asset exposure profiles.

For other physical climate risks—such as extreme heat, drought, extreme precipitation, and extreme cold—no material economic losses have historically been recorded at our facilities. As a result, we currently lack sufficient empirical data to directly calibrate financial impact models for these hazards. The Company is therefore continuing to conduct internal interviews, collect operational and financial data, and develop scenario-based forecasting methodologies.

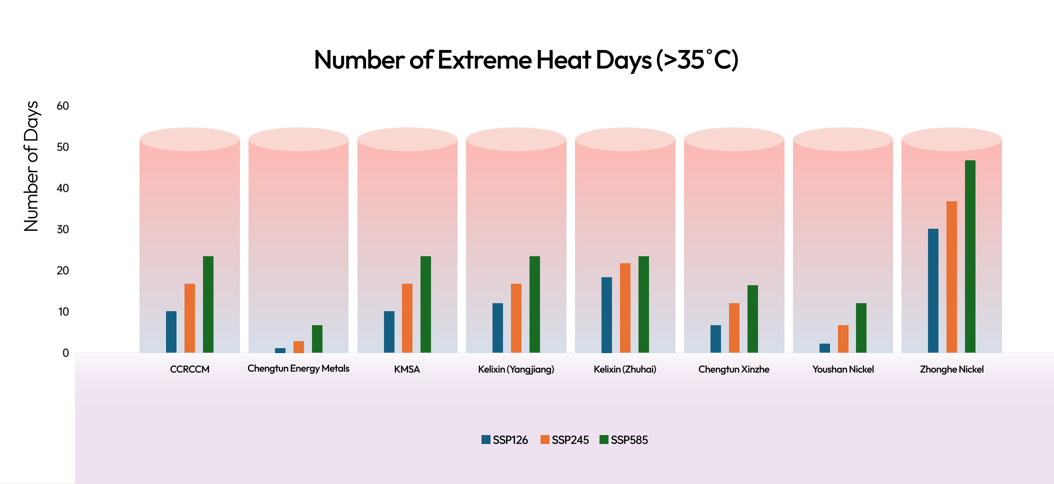



Figure: Overview of Extreme Heat at Each Facility

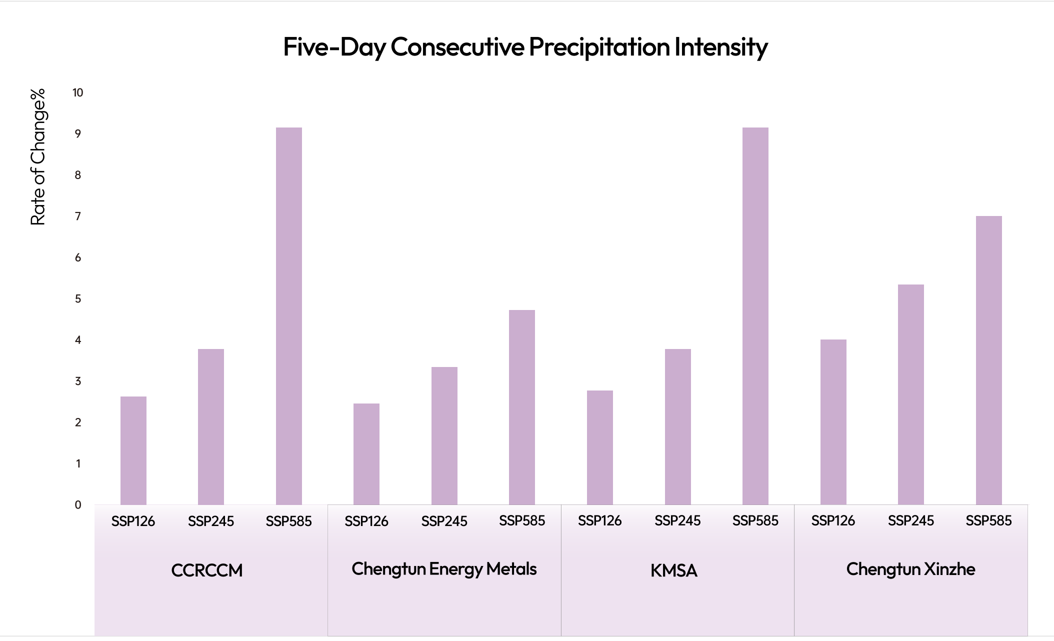



Figure: Overview of Changes in R5X Intensity at Each Facility

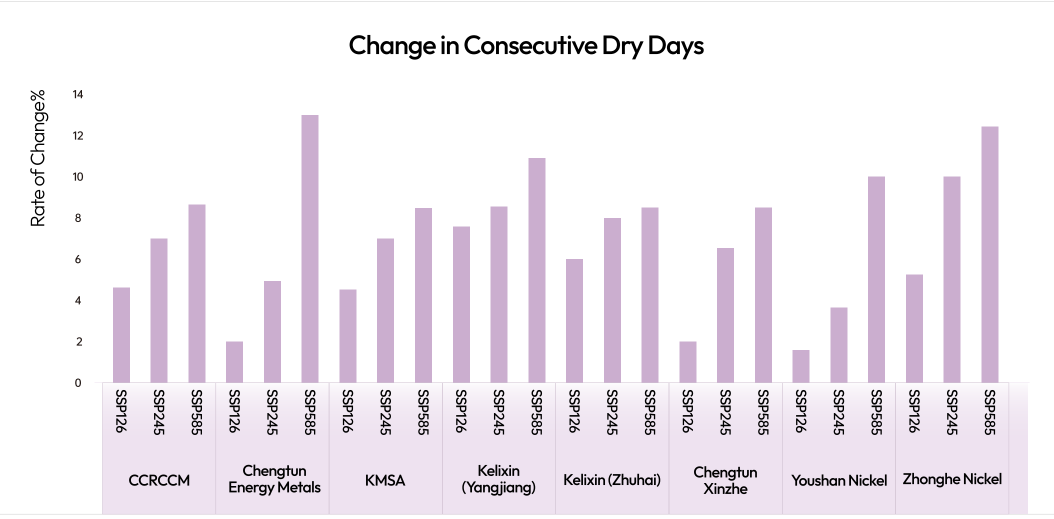



Figure: Overview of CDD Changes at Each Facility





## Response measures overview

### Extreme heat

To address the risks posed by extreme heat to both operations and workforce safety, the company has established a multi-layered response framework across all operating sites. During drought conditions and peak summer periods, when grid power supply can be constrained, all subsidiaries are equipped with backup generators to ensure the continuous operation of security systems and critical safety infrastructure. In addition, contingency plans for power interruptions have been developed to minimize the risk of production disruption. Since annual equipment shutdowns for maintenance are required, these are strategically scheduled during periods of peak summer grid demand, thereby avoiding potential impacts from externally imposed power-rationing measures.

From an occupational health and safety perspective, each facility has implemented comprehensive heat-stress prevention and temperature alert systems. Real-time monitoring of ambient conditions, together with adjusted work schedules, helps reduce the risk of heat-related illness while ensuring workloads remain within safe limits. Operationally, the Company continues to improve the efficiency of water recirculation systems to mitigate increased energy consumption and cooling loads associated with extreme heat.

Taken together, these measures enhance facility resilience under high-temperature conditions, safeguard the reliable operation of critical assets, and reduce production volatility.

### Extreme cold

Chengtun Zinc & Germanium previously experienced a production suspension caused by extreme winter low temperatures that led to freezing of certain pipelines and equipment. In response, the Company has implemented targeted winterization upgrades in high-risk areas, including enhanced pipe insulation and the installation of electric heat-tracing systems, as well as the deployment of emergency heating units across the site.

At the same time, all facilities have established cold-weather early warning and inspection protocols. When temperatures approach critical thresholds, emergency response procedures can be activated immediately to mitigate operational and safety risks.

### Extreme precipitation

To manage risks associated with extreme precipitation, the Company has installed comprehensive drainage systems at all operating sites and equipped them with emergency pumping units. Flood emergency response plans have been established and are tested regularly through drills to ensure safe operations during periods of intense rainfall.

At the Company's operations in the Democratic Republic of the Congo (KMSA, CCR, and CCM), where rainy seasons are prolonged, tailings storage facilities have been engineered to meet a 1-in-100-year flood protection standard. Drainage channels have been widened, and displacement monitoring instruments have been installed on tailings dams to enable real-time monitoring. These measures, combined with routine inspections and reinforcement works, reduce the risk of dam instability and landslides. Mining operations are suspended immediately during rainfall events to safeguard personnel.

In addition, the company has strengthened external transport routes and increased inventories of critical raw materials and fuels to mitigate potential production disruptions caused by seasonal transport interruptions. At Chengtun Zinc & Germanium, which is located in mountainous terrain, slope stabilization and protective engineering measures have been implemented to enhance hillside stability and reduce the risk of landslides or site inundation triggered by heavy rainfall.

Collectively, these measures ensure the safety of production facilities and enhance operational resilience under extreme precipitation conditions.

### Landslides

Landslide risk is primarily concentrated at Chengtun Zinc & Germanium, whose facility is located in mountainous terrain. In 2023, an extreme rainfall event triggered a landslide that caused severe damage to site infrastructure. In response, the Company has established flood and geological hazard early-warning systems, conduct regular flood emergency drills, and works in coordination with local government authorities to implement slope remediation and reinforcement projects. These measures enhance hillside stability and reduce the likelihood that future landslides could threaten production or employee safety.

Relevant case details and associated financial impacts are presented in subsequent sections.

### Drought and Water Stress

To address risks associated with drought and water scarcity, the Company has broadly implemented closed-loop water recycling systems across its facilities and constructed rainwater harvesting ponds to improve water-use efficiency. In the DRC where dry seasons are pronounced, certain sites have shown early signs of minor groundwater level decline while still meeting production requirements.

To reduce reliance on groundwater, local operations actively utilize mine return water by connecting pit water reservoirs with process water systems, creating a stable supplemental supply. Current monitoring indicates that pit water levels remain stable and have not declined. At the same time, the Company has strengthened water-use monitoring and tiered allocation practices to ensure continuity of smelting and beneficiation operations during peak dry-season periods.

Collectively, these measures have significantly enhanced water resource management resilience and reduced the potential impact of drought on production and operations.

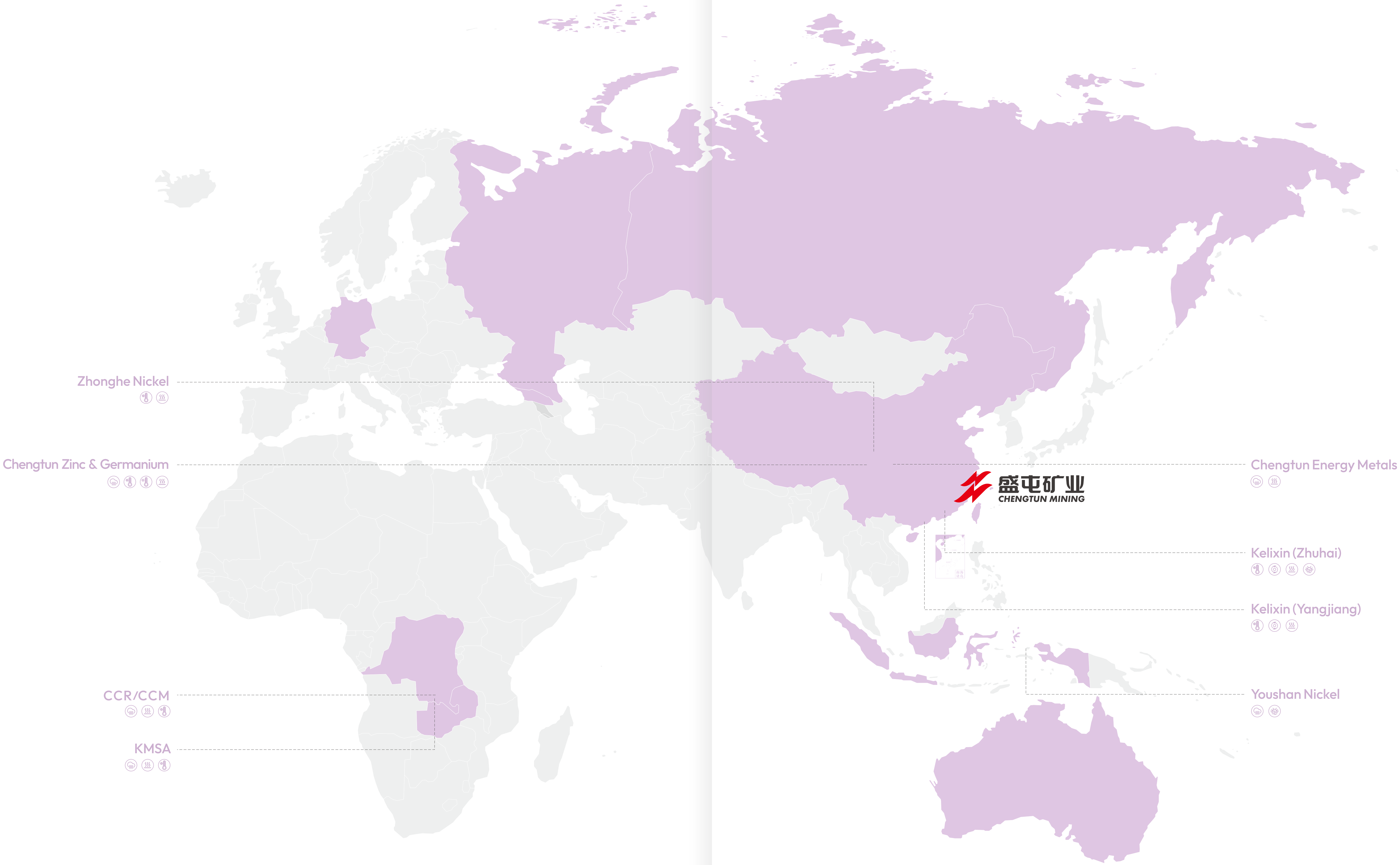
### Severe Typhoons

See the case study section for detailed analysis.

### Sea-Level Rise

To address risks associated with sea-level rise, the Company has conducted elevation surveys at its coastal facilities—including Kelixin (Zhuhai), Kelixin (Yangjiang), and Youshan Nickel—and benchmarked site elevations against local high-tide levels. The results indicate that all facilities currently remain within safe elevation ranges, with no direct inundation risk anticipated in the short to medium term.

The Company will continue to monitor sea-level trends and incorporate provisions for structural reinforcement and potential elevation adjustments for ports and plant infrastructure into its medium- and long-term planning, in order to manage uncertainties associated with future flooding or storm-surge events.


Zhonghe Nickel
Chengtun Zinc & Germanium
CCR/CCM
KMSA
Chengtun Energy Metals
盛屯矿业
CHENGTUN MINING
Kelixin (Zhuhai)
Kelixin (Yangjiang)
Youshan Nickel

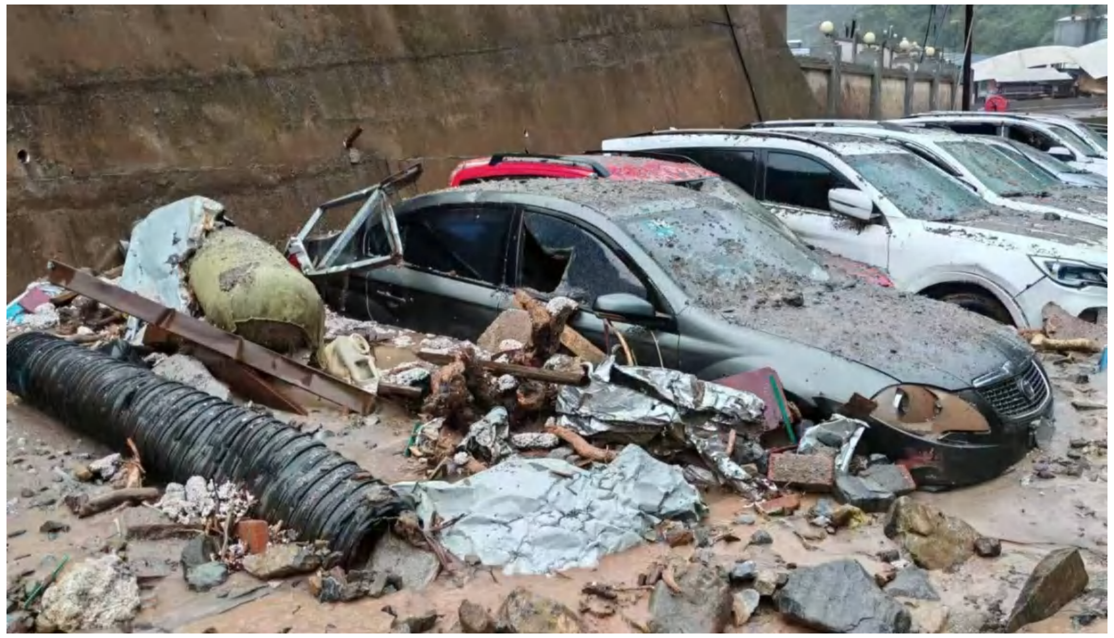
# 03. Case Studies of Climate Physical Risk Management

## Case Study: Rainstorm-Induced Debris Flow at the Chengtun Zinc & Germanium

### 01 Incident Background and Overview

At 02:30 on July 20, 2024, an extreme rainstorm struck Xinhua Village, Malie Township, Hanyuan County, Ya'an City, Sichuan Province, triggering flash floods and debris flows. Communications, roads, and bridges were disrupted, more than 30 people were reported missing, and over 40 houses were damaged. Provincial, municipal, and county governments immediately activated Level I emergency response protocols for natural disasters, with senior provincial officials arriving on site to direct rescue operations.

The Company's subsidiary, Chengtun Zinc & Germanium is located downstream of the affected area. Due to intense rainfall and upstream slope failures, debris flows carrying large volumes of sediment and rock inundated parts of the facility. Sections of the site were buried under debris, access roads sustained severe damage, and operations across the entire plant were suspended.







### 02 Plant damage and financial impact

The disaster occurred at approximately 02:20 on July 20, forcing shutdown of operations. After emergency repairs, ignition and reheating resumed at 22:00 on August 23, and full feed restart occurred at 02:46 on August 24, resulting in approximately 35 days of downtime.

Major economic losses:

| Loss Category | Amount (RMB) |
|---|---|
| Repair costs (external pipelines, walls) | 1,000,000 |
| Civil works (land loss, site leveling) | 5,517,710 |
| Net value of scrapped equipment | 6,101,791 |
| Inventory losses | 2,498,779 |
| Slope remediation works | 7,880,000 |
| Total direct losses | 22,998,281 |
| Production loss | 1,083,169 |
| Indirect downtime losses | 1,083,169 |
| Insurance compensation | 6,290,000 |

Total disaster losses amounted to approximately RMB 23 million, of which insurance covered about 26%, representing roughly 0.9% of annual profit.

### 03 Causes and Frequency Analysis

Ya'an's steep terrain and narrow valleys create concentrated runoff conditions. The Chengtun Zinc & Germanium is located downstream near a typical gully outlet with steep slopes and high runoff convergence, making it highly susceptible to flash floods and debris flows during heavy rainfall.

In mid-July 2024, the combined influence of an unusually strong subtropical high-pressure system and southwest monsoon moisture transport produced persistent intense rainfall. Cumulative precipitation significantly exceeded historical averages, saturating slopes and destabilizing loose surface materials, triggering large-scale landslides and debris flows.

Based on the Company's CMIP6 multi-model ensemble climate simulations, under SSP2-4.5 and SSP5-8.5 scenarios, extreme precipitation intensity in the Ya'an region is projected to increase:

The maximum one-day precipitation indicator (R1Xday) is projected to increase by approximately 4.2% under SSP2-4.5 and 9.3% under SSP5-8.5 relative to the baseline period (1995–2014). The maximum five-day cumulative precipitation indicator (R5Xday) is projected to rise by approximately 5.4% and 7.1%, respectively.

This indicates that under a warmer and wetter climate regime, extreme rainfall events will become stronger, longer-lasting, and more likely to trigger secondary hazards such as landslides and debris flows. These projections align closely with the causes of the July 20 event, confirming that the watershed in which the plant is located is highly climate-sensitive and requires priority monitoring and risk management.

## 04 Response and Lessons Learned

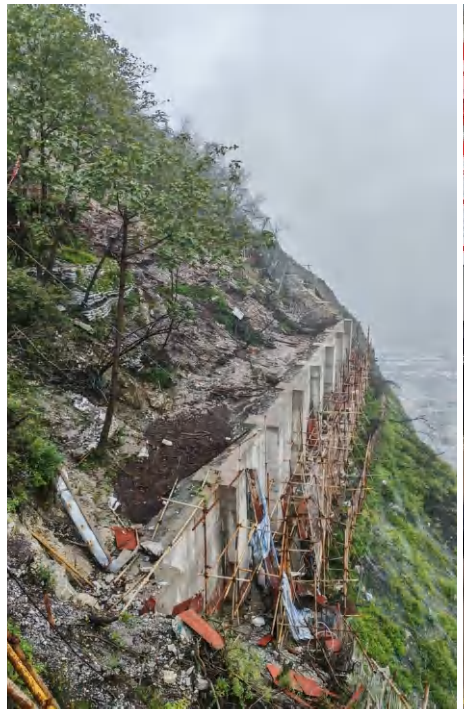
Immediately after the incident, Chengtun Zinc & Germanium activated its Geological Disaster Emergency Plan, reported the situation to local authorities and the Company's HSE management center, and organized rapid evacuation of all on-duty personnel to elevated safe zones, ensuring zero casualties.

Simultaneously, safety and equipment teams shut down power supply systems, gas pipelines, and critical equipment to prevent secondary incidents. Once rainfall subsided, an on-site emergency command group coordinated rescue, assessment, restoration, and insurance claims.

Post-event actions included rapid restoration of communications and transportation, debris clearance, and systematic repairs to roads, walls, drainage channels, and equipment foundations. A third-party geological engineering firm conducted slope stability assessments, followed by structural reinforcement works including retaining wall construction and slope stabilization north of the plant to mitigate future landslide risks.

After loss verification, the Company initiated insurance claims and received approximately RMB 6.29 million in compensation. Following more than a month of repairs, operations resumed on August 24.

This event demonstrates that extreme rainfall and associated debris flows have become one of the principal physical risks affecting operational and asset safety at Chengtun Zinc & Germanium. While the response validated the effectiveness of the Company's emergency systems, it also highlighted weaknesses in rainfall monitoring and drainage capacity. The Company has since enhanced early-warning coordination mechanisms, increased drainage redundancy, strengthened slope protection standards, and intensified emergency drills to further improve climate resilience.


## Case Study:
## Impact of Super Typhoon "Huajiasha" on Kelixin (Yangjiang) and Kelixin (Zhuhai)

### 01 Incident Background and Overview

At 20:00 on September 18, 2025, Super Typhoon Huajiasha (International No. 2518) formed over waters east of the Philippines. Driven by persistently elevated sea surface temperatures and an unusually stable subtropical high-pressure system, the storm intensified rapidly and was upgraded to super typhoon status on the morning of September 21, with maximum sustained winds exceeding Level 17 (approximately 62 m/s), making it one of the strongest tropical cyclones in the Northwest Pacific in 2025.

At 15:00 on September 22, the storm made landfall at Panuaitan Island in northern Philippines at super typhoon strength, crossed Luzon, entered the South China Sea, and continued toward southern China. On the afternoon of September 24, meteorological authorities determined that although its intensity weakened slightly prior to landfall, it remained at typhoon strength. It made landfall near Hailing Island, Yangjiang, Guangdong Province, at approximately 17:00, with sustained winds of 48–52 m/s and gusts exceeding Level 15, accompanied by torrential rainfall, storm surges, and localized wave overtopping, causing severe impacts along the Guangdong coast.

The Company's subsidiaries Kelixin (Zhuhai) and Kelixin (Yangjiang) were both located directly within the storm's impact path. Meteorological authorities identified this event as the strongest typhoon affecting Zhuhai in the past decade. The combination of extreme winds and rainfall caused severe flooding on surrounding access roads and structural damage to certain facilities. Post-event damage assessments indicated total direct asset losses of RMB 2.966 million, including RMB 1.457 million at Kelixin (Zhuhai) and RMB 1.518 million at Kelixin (Yangjiang), primarily involving roofs, perimeter walls, drainage systems, and portions of structural infrastructure. The loss represented approximately 0.16% of annual profit.





### 02 Emergency Response and On-Site Management

In response to the approaching typhoon, both sites mobilized rapidly and fully implemented provincial and municipal storm-defense directives. On the afternoon of September 22, the Company convened a dedicated preparedness meeting to communicate government instructions and immediately activated the highest-level "Three-Prevention" emergency plan (flood, typhoon, and storm surge). A command team led by senior management was established to coordinate responsibilities and utilize the pre-landfall preparation window to build four defensive lines: early warning, response, protection, and materials readiness.

- **Early-warning system:** Real-time tracking of storm trajectory using meteorological monitoring and local forecast data, enabling advance evacuation and shutdown planning.
- **Emergency command system:** Strict 24-hour duty coverage and leadership rotation ensured uninterrupted communication and immediate response capability.
- **Physical protection measures:** Comprehensive safety inspections led by management teams, installation of sandbags, reinforcement of doors, windows, and roofs, drainage system clearing, and trimming of tall vegetation to improve wind and flood resistance.
- **Materials readiness:** The HSE department conducted full inventories of emergency supplies including sandbags, pumps, lighting equipment, life jackets, wooden stakes, shovels, and ropes to ensure adequate reserves.

In accordance with provincial suspension orders, both plants ceased operations at 12:00 on September 23, and non-essential staff were evacuated in advance. Personnel remaining on site for emergency duties were supplied with sufficient drinking water, food, and protective equipment. During landfall, although communications and power were temporarily disrupted, emergency command systems remained functional and no casualties occurred.

After the typhoon passed, the Company immediately organized inspections, debris clearance, and repair work, restoring transport and power supply as quickly as possible. Structural integrity, electrical systems, and equipment foundations were comprehensively assessed. Kelixin (Zhuhai) reinforced aging roof structures and upgraded wind resistance, while Kelixin (Yangjiang) completed drainage rehabilitation, slope reinforcement, and wall repairs, laying the foundation for full production resumption.

### 03 Follow-Up Action Plan

Under SSP2-4.5 and SSP5-8.5 climate scenarios, typhoons are projected to become more frequent, particularly under SSP5-8.5. To ensure orderly recovery and strengthen long-term disaster resilience, Kelixin (Zhuhai) and Kelixin (Yangjiang) developed a phased action plan consisting of three stages:

- **Stage 1 — Emergency stabilization and comprehensive assessment**

  Immediately following the storm, full safety inspections were conducted jointly by engineering and safety teams. Buildings, electrical systems, gas pipelines, and equipment foundations were examined to eliminate residual hazards. Detailed loss inventories were prepared in collaboration with equipment manufacturers, engineering contractors, and insurance assessors, producing authoritative assessment reports to support repairs and claims. Debris removal, water drainage, and initial disinfection restored basic working and living conditions.

- **Stage 2 — Reconstruction and production recovery**

  Based on assessment findings, site-specific technical repair plans and construction schedules were developed and implemented in phases following corporate approval. Priority was given to restoring roofs, drainage systems, and critical production equipment. Kelixin(Zhuhai) completed replacement of wind-resistant doors and windows and roof reconstruction, while Kelixin (Yangjiang) optimized drainage systems and reinforced flood channels, significantly improving protective capacity.

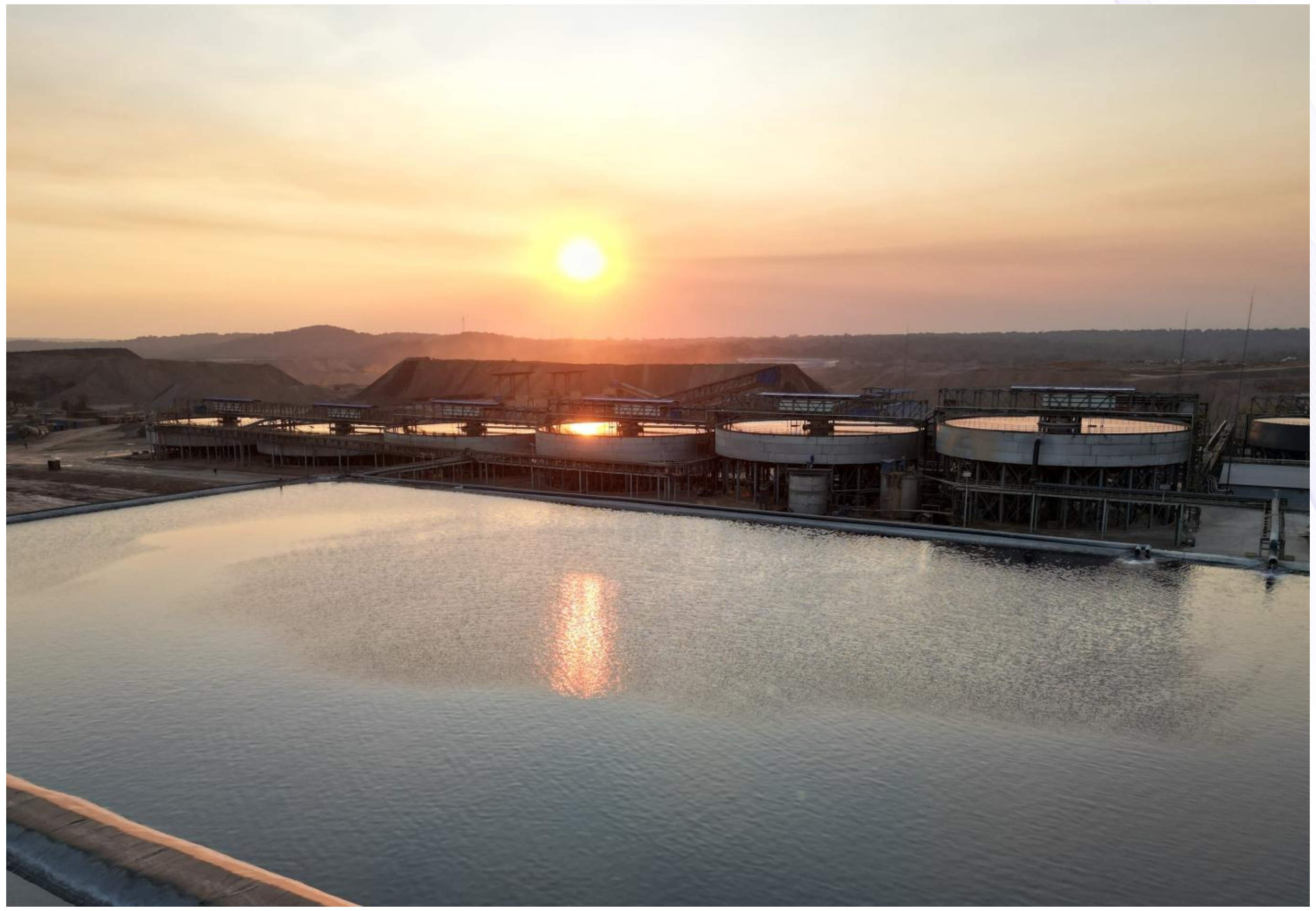
- **Stage 3 — Review and capacity enhancement**

  The Company continues to monitor insurance claims through dedicated personnel responsible for documentation, coordination, and reimbursement follow-up. A post-incident review meeting was held to evaluate lessons learned and identify improvement areas. The Natural Disaster Emergency Plan has since been revised, and systematic upgrades are planned for wind-resistance standards, drainage systems, and protection levels of critical equipment. These measures will establish a long-term disaster-prevention framework and strengthen future resilience from institutional, engineering, and management perspectives.

## Case Study: Tailings Storage Facility Management at KMSA

Based on the Company's climate scenario analysis, under the SSP5-8.5 high-emissions pathway, annual extreme precipitation in the Democratic Republic of the Congo is projected to increase by approximately 8.5%, while the maximum five-day rainfall indicator is expected to rise by 9.2%. Controlled by equatorial rain belts, the region already experiences prolonged wet seasons. Structural instability, overtopping, or seepage at critical facilities such as tailings storage facilities during these periods could pose significant risks to personnel, the environment, and operations.

Although no accidents or major hazards caused by heavy precipitation have occurred at the KMSA tailings facility to date, scenario modeling indicates elevated future risk exposure. The Company has therefore proactively implemented systematic preventive engineering measures to strengthen facility resilience and safety.



- **In 2025, major works undertaken included:**

1. Maintenance of return-water systems (tailings and acidic return pipelines, pumps);
2. Replacement and repair of anti-seepage liners to improve containment integrity;
3. Construction of auxiliary access structures (cable-stayed bridge and pontoon bridge) to maintain operational access;
4. Structural repairs to the main dam's tertiary catchment basin and installation of diversion systems to prevent water accumulation at the outer dam toe;
5. Restoration of tailings embankments and widening of drainage channels to enhance discharge capacity;
6. Reinforcement of floating platform structures to support safe water-area operations.

As noted earlier, climate change is expected to increase both the frequency and intensity of extreme precipitation events in the Democratic Republic of the Congo. To manage risks such as slope collapse or working-face instability caused by prolonged rainfall, KMSA has adopted a three-tier management framework as the core approach for extreme precipitation control in mining operations: preventive suspension, real-time monitoring, and emergency response.





## Case Study: Mining Workshop Management at KMSA

As noted earlier, climate change is expected to increase both the frequency and intensity of extreme precipitation events in the Democratic Republic of the Congo. To manage risks such as slope collapse or working-face instability caused by prolonged rainfall, KMSA has adopted a three-tier management framework as the core approach for extreme precipitation control in mining operations: preventive suspension, real-time monitoring, and emergency response.

- **Preventive suspension mechanism**

  Open-pit operations are highly susceptible to foundation softening and slope instability during heavy rainfall. Accordingly, the mining workshop has established a policy that mining activities in areas with steep slopes, weak rock masses, or potential landslide zones are suspended during continuous or intense rainfall events. This measure prioritizes personnel safety and shifts risk mitigation to the operational decision stage, preventing sudden collapses during rainfall.

- **Enhanced Monitoring and Early Warning**

  Displacement monitoring points are installed in high-risk zones and critical platforms to continuously track slope movement, settlement, and other key indicators. Technical monitoring is supplemented by manual inspections, forming a dual-layer defense system. Any abnormal readings or field observations immediately trigger internal warning procedures, allowing advance evacuation and area control.

- **Institutional Framework and Emergency Drills**

  The Company has developed and implemented an Emergency Response Plan for Open-Pit Slope Collapse Accidents, identifying heavy rainfall as a key triggering factor and defining procedures for reporting, evacuation, site control, and emergency response. Regular emergency drills simulate slope instability scenarios following prolonged rainfall, testing shutdown decisions, command coordination, and field response effectiveness. These exercises continuously improve employee preparedness and coordination capability under extreme weather conditions.

# Managing climate transition risks

# CHAPTER 05

CHENGTUN MINING

## Enhancing strategic resilience in a rapidly decarbonizing global economy

Against the backdrop of an accelerating global transition toward a low-carbon economy, we are undertaking a comprehensive assessment of the transition risks that our company has faced, and may face in the future, under different decarbonization scenarios. This analysis is intended to inform the development of effective response strategies and ensure that the Company maintains long-term regulatory compliance, competitiveness, and value chain stability throughout the global energy transition and the pursuit of carbon neutrality.

- Our methodology for identifying, validating, and analyzing climate transition risks
- Transition risk analysis
- Financial implications of climate transition risks on performance





CLIMATE TRANSITION RISKS AND

## RESPONSE METHODS

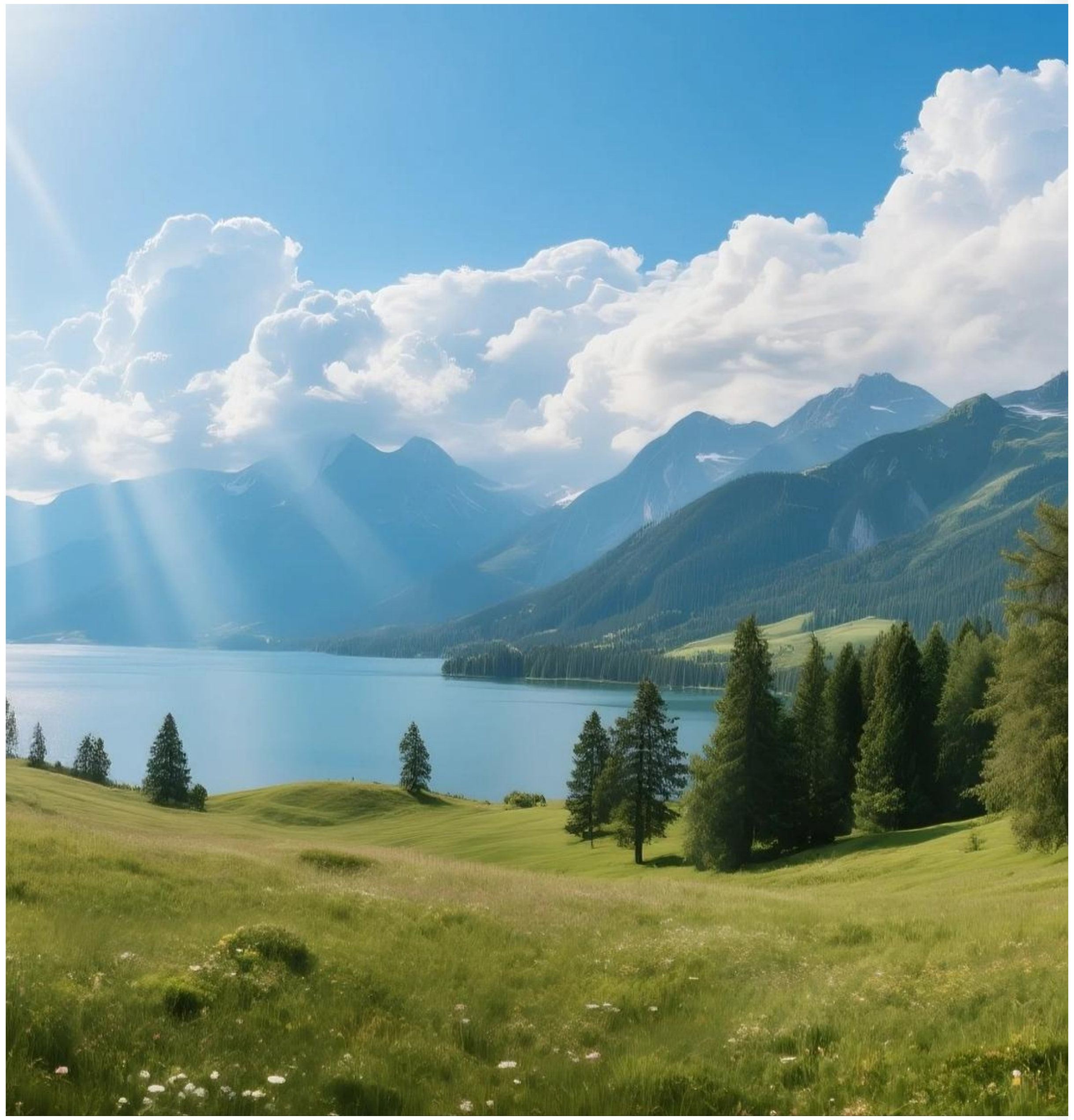
Governments and regulators worldwide are accelerating the introduction of policies and regulations related to the energy transition. Carbon pricing mechanisms — including emissions trading systems and carbon taxes — are expanding in scope across sectors and jurisdictions. In China, the national mandatory carbon market, initially covering the power sector, is being extended to industries such as steel and cement. The European Union has introduced the Carbon Border Adjustment Mechanism (CBAM), which will enter its definitive phase on 1 January 2026, establishing carbon-related trade measures for carbon-intensive products. At the same time, major economies are tightening energy efficiency standards, promoting direct procurement of renewable electricity, and advancing power sector decarbonization. As a result, the threshold for low-carbon participation in global value chains is rising rapidly.

For companies, the global transition to a low-carbon economy presents not only opportunities but also significant challenges. As governments adopt increasingly stringent climate policies, major economies accelerate structural adjustments in their energy systems, and capital markets and customers place growing emphasis on low-carbon supply chains, our operating environment is undergoing profound change. These developments may directly affect compliance costs, product competitiveness, access to capital, and long-term strategic positioning. It is therefore essential that we comprehensively identify and assess potential transition risks and test the resilience of our business under different climate scenarios to ensure sustained competitiveness in an evolving energy landscape.

Accordingly, we proactively identify and evaluate the transition risks across our operations and value chain and are developing a low-carbon transition strategy informed by climate scenario analysis. Our strategic planning incorporates carbon cost modelling, energy substitution pathways, and evolving customer requirements for low-carbon products. This approach is designed to maintain long-term compliance and competitiveness in an increasingly carbon-constrained global environment, while positioning the Company to capture emerging opportunities in green finance and low-carbon markets.

# 01. Methodology for Identifying and Assessing Climate Transition Risks

Climate-related risks are generally categorized into two broad types: physical risks and transition risks. Transition risks arise from non-physical factors associated with the shift to a low-carbon economy, including changes in public policy and regulation, technological pathways, market structures, investor expectations, and societal sentiment. These risks are closely linked to the global carbon neutrality agenda, structural adjustments in energy systems, and the tightening of regulatory frameworks, and therefore represent a critical area of focus for the Company going forward.







## Climate Transition Risks

Transition risks refer to non-physical risks arising in the course of the transition to a low-carbon economy, driven by developments in policy and regulation, technological change, market dynamics, investor behavior, and public perception.

**Policy and regulatory risk**

The introduction of new climate-related regulations — such as emissions trading schemes, energy efficiency standards, and green procurement requirements — may increase compliance costs and impose additional operational constraints.

**Technology risk**

The rapid deployment of emerging low-carbon technologies may render existing production processes, equipment, or products less competitive in terms of carbon performance, cost structure, or market acceptance.

**Market risk**

Shifts in consumer preferences, evolving requirements from downstream customers, and restructuring of value chains may result in raw material price volatility, loss of orders, or margin compression.

**Reputational risk**

If a company lacks transparency or demonstrates insufficient progress in climate governance, emissions reduction commitments, or green transformation efforts, it may face investor divestment, adverse media coverage, or public scrutiny, potentially undermining brand value and stakeholder trust.

One approach to identifying climate-related risks and opportunities is to consider a range of potential temperature pathways and transition scenarios. The evolution of government policies, the regional impacts of climate change, and the pace and effectiveness of adaptation efforts through 2050 remain subject to significant uncertainty. Assessing corporate resilience therefore requires evaluating performance under a range of plausible outcomes and stress-testing the business against multiple transition pathways.

## Methodology for Assessing Climate Transition Risks

To maintain resilience under different decarbonization pathways, we identify and assess potential transition risks using a analytical framework to support long-term planning and investment decisions. On this basis, we have established the following transition risk assessment framework:

- **Scenario-driven approach:**
To assess climate transition risks, we adopt a scenario-based methodology, referencing the three core scenarios presented by the International Energy Agency (IEA) in the World Energy Outlook 2025 — namely the CPS, STEPS, and NZE scenarios (see Table 1 for details). These scenarios reflect potential transition pathways under varying levels of policy stringency and energy system transformation through 2030, 2040, and 2050. Based on these scenarios, we develop key assumptions regarding changes in carbon allowance prices, shifts in energy mix, and evolving demand for low-carbon products across industries, which are then used to model the potential impacts of different transition pathways on the Company.

- **Risk transmission analysis:**
Our framework places particular emphasis on understanding how risks are transmitted, rather than merely describing scenario outcomes. Tightening policies and regulations may translate directly into higher compliance costs through rising carbon prices and emissions trading obligations. Shifts in market demand may drive downstream customers to require lower-carbon materials and greater carbon footprint transparency, prompting adjustments to product portfolios. Technological advancements may necessitate process upgrades, and insufficient investment in R&D or capital expenditure could weaken future competitiveness. In parallel, evolving expectations in financial markets — including ESG ratings, climate performance assessments, and financing thresholds — may influence the cost of capital and access to funding.

- **Integration of quantitative and qualitative analysis:**
Our assessment combines both quantitative and qualitative approaches. Quantitative analysis includes modelling the impact of carbon price trajectories under different transition scenarios, changes in renewable electricity premiums on revenue and cost structures, and projected demand growth for metals such as copper, nickel, and cobalt driven by the expansion of renewable energy and energy storage. Qualitative analysis is informed by customer engagement, supply chain surveys, and dialogue with investors and financial institutions, enabling us to capture evolving expectations related to low-carbon procurement, financing conditions, and strategic positioning.

Figure 1: Process for Assessing Climate Transition Risks

Transition scenario modelling: Drawing on the International Energy Agency (IEA) transition scenarios (CPS, STEPS, and NZE), we analyze projected carbon allowance price trajectories, changes in the energy mix, and the implications for demand for critical energy transition metals under different policy pathways.

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Risk transmission chain analysis: We map how external drivers — including policy, market, technology, and financial factors — transmit through to corporate operations. This includes identifying compliance cost impacts arising from rising carbon allowance prices, market structure adjustments driven by customers' low-carbon requirements, technology upgrade pressures associated with decarbonization, and potential financing constraints linked to evolving capital market expectations.

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Integrated quantitative and qualitative assessment: We quantify cost and revenue impacts under different climate transition scenarios within our financial modelling framework. In parallel, we gather forward-looking insights through customer interviews, supply chain questionnaires, and engagement with investors regarding low-carbon procurement standards and financing requirements. These quantitative and qualitative inputs are integrated to form a comprehensive assessment of transition risk exposure.

Through the application of the above methodology, we are able to systematically identify key categories of climate transition risks, including, but not limited to: tightening policy and regulatory requirements (such as the expansion of mandatory national emissions trading schemes and green procurement standards); shifts in market demand (including growing demand for low-carbon raw materials and products); technological pathway evolution (where clean energy and low-carbon processes progressively replace conventional production methods); and financial and reputational pressures (including changing investor preferences, rising financing costs, and fluctuations in ESG ratings).

This assessment framework also provides a robust analytical basis for evaluating potential impacts such as increased compliance costs, erosion of product competitiveness, constrained access to capital, loss of customers within the value chain, and potential impairment of brand value. By linking scenario assumptions to operational and financial outcomes, the framework supports informed decision-making and strengthens our ability to respond proactively to transition-related risks.

The climate transition scenarios applied in this report are based on the energy transition pathways outlined by the International Energy Agency (IEA) in the World Energy Outlook 2025.

Table 1: Overview of Climate Transition Scenarios

| Scenario | Full Name | Core Assumptions | Emissions Outcome by 2050 | Shadow Carbon Price (2030 / 2050) | Energy and Policy Characteristics | Transition Risk Implications |
|---|---|---|---|---|---|---|
| CPS | Current Policies Scenario | Reflects only policies and regulations that have already been implemented and are in force | Emissions remain at elevated levels over the long term broadly consistent with a pathway close to 3˚C warming | Low | Slow deployment of renewable energy; fossil fuels continue to account for a high share of the energy mix | Lower short-term compliance pressure, but heightened risk of abrupt policy tightening over the medium to long term |
| STEPS | Stated Policies Scenario | Incorporates announced policy commitments and plans that are not yet fully implemented | Emissions decline but do not reach net zero; broadly aligned with an approximately 2.5˚C pathway | Moderate | Expansion of mandatory carbon markets; gradual phase-out of free allocation; steady growth in clean energy | Noticeable increase in carbon costs over the medium term, progressively compressing profit margins |
| NZE | Net Zero Emissions by 2050 Scenario | Assumes global net zero emissions are achieved by 2050 | Net zero emissions reached by 2050 | High | Rapid phase-out of fossil fuels; large-scale expansion of renewable electricity, electrification and CCUS. | Highest Transition Pressure Significant risk of high-carbon asset stranding |

# 02. Climate transition risk analysis

## Potential climate transition isks

Table 2: Overview of potential impacts of climate transition risks on operations and financial performance

| Risk category | Identification approach | Potential operational impacts | Potential financial impacts |
|---|---|---|---|
| Policy and regulatory risk | Based on the CPS, STEPS and NZE scenarios in the IEA World Energy Outlook 2025, we assess carbon pricing trajectories under different pathways and review the expansion of carbon markets, tightening energy efficiency standards and emissions control policies in China and other jurisdictions where we operate. | Tightening carbon allowance caps, rising carbon costs and stricter energy efficiency requirements may increase compliance burdens and necessitate continuous enhancement of carbon management systems. | Rising carbon prices may increase unit production costs; higher compliance expenditures and additional capital investment may be required for emissions reduction measures and regulatory compliance capabilities. |
| Market risk | Ongoing monitoring of downstream customer carbon footprint requirements, low-carbon procurement policies and development trends in sectors such as electric vehicles and energy storage, combined with IEA projections for critical minerals demand and renewable electricity premiums. | Failure to meet customer carbon intensity expectations may result in loss of orders, restricted partnerships and reduced market competitiveness. | Reduced pricing power, pressure on revenues and cash flow volatility resulting from potential loss of key customers. |
| Technology risk | Assessment of technological pathways under the NZE and STEPS scenarios, including low-carbon smelting, electrification and CCUS, compared against the company's existing processes and the prevailing level of low-carbon technology adoption in the industry. | Gaps in carbon efficiency relative to leading low-carbon technologies may weaken long-term competitiveness; insufficient deployment of low-carbon technologies may limit strategic positioning. | Increased capital expenditure for low-carbon retrofits and equipment upgrades; potential asset impairment or stranded asset risk if technology pathway decisions prove misaligned with market developments. |
| Financial and reputational risk | Analysis of green finance policies, ESG rating methodologies and climate disclosure expectations from financial institutions and investors, combined with monitoring of regulatory and societal scrutiny of high-emission sectors. | Tightening financing conditions; certain financial institutions may restrict funding for high-carbon projects; negative public perception may affect brand reputation. | Higher cost of capital, reduced access to financing, downward pressure on valuation and potential loss of strategic partnership opportunities. |





## Results of climate transition risk analysis

Table: Overview of climate transition risk

| Risk category | Key analytical indicators | China operations | Indonesia operations | DRC operations | Time horizon | Response measures |
|---|---|---|---|---|---|---|
| Policy risk | Carbon price trajectories and carbon market coverage under the IEA World Energy Outlook 2025 CPS, STEPS and NZE scenarios | The national ETS continues to expand, with sectors such as steel, cement and non-ferrous metals progressively included. Carbon prices are rising steadily. Dual control of energy consumption and tightening carbon intensity targets increase the risk of production restrictions if efficiency standards are not met. | The power mix remains coal-dominated and may gradually be incorporated into a national mandatory carbon market. The pace and stringency of future energy transition policies remain uncertain. | Local carbon constraints are currently limited; however, exports are highly dependent on the EU and China. If end-use markets introduce carbon-related requirements, upstream raw material production may be incorporated into supply chain regulation | Short to medium term | (1) Strengthen corporate- and product-level carbon accounting and management systems and establish phased decarbonization plans.<br>(2) Reduce carbon intensity through energy efficiency improvements, renewable electricity procurement and process optimization. |
| Energy transition risk | Fossil fuel demand and price trends under IEA WEO 2025 scenarios | Smelting operations rely primarily on grid electricity, largely coal-based. Under STEPS and NZE, power sector decarbonization accelerates and carbon costs become embedded in electricity prices, creating upward pressure on energy costs. | Smelters operate captive coal-fired power plants (off-grid). While global coal demand declines under STEPS and NZE, captive coal power remains viable in the short term due to infrastructure constraints. Over the long term, tightening domestic and export market carbon policies may increase compliance costs and operational uncertainty. | Global coal and oil demand decline over the medium to long term. However, price volatility may increase due to reduced investment, logistics constraints and carbon costs. For projects relying on captive coal or diesel generation, lower fuel prices may not translate into stable cost advantages. | Long term | (1) Promote electrification and diversification of the energy mix.<br>(2) Develop distributed renewable energy projects.<br>(3) Secure long-term clean energy supply through green power purchase agreements (PPAs). |
| Renewable electricity supply risk | Share of renewable generation and grid integration capacity based on WEO 2025 projections | Installed renewable capacity continues to grow; however, grid integration capacity and direct green power procurement mechanisms remain limited, and short-term green premiums persist. | The electricity mix remains coal-based, and renewable investment and grid development lag behind, limiting industrial access to green power. | Although hydropower resources are abundant, ageing infrastructure and limited transmission capacity constrain stable renewable supply. | Short to medium term | (1) Develop on-site solar PV and storage facilities.<br>(2) Expand direct green power procurement and renewable energy certificate (REC) purchases. |
| Customer low-carbon demand risk | Customer net-zero targets and supply chain carbon footprint requirements aligned with IEA emissions pathways | Downstream new energy, battery and advanced manufacturing customers increasingly require product carbon footprint disclosure as a condition of supplier qualification. | Export-oriented smelting products must meet international customer carbon disclosure and reduction requirements. | Mineral exports to international markets face increasing carbon footprint disclosure expectations. | Short to medium term | (1) Establish product carbon footprint management systems.<br>(2) Strengthen collaboration with key customers on decarbonization.<br>(3) Develop low-carbon product lines. |
| Technology risk | Investment trends in clean energy and low-carbon technologies under WEO 2025 | Delays in low-carbon retrofits may widen the gap relative to industry-leading technologies. | Continued reliance on conventional coal-based processes may increase long-term upgrade pressures. | Limited technological capacity in mining and energy utilization increases barriers to low-carbon technology adoption. | Long term | 1.Conduct low-carbon technology pathway assessments based on actual production conditions<br>2.Prioritize energy efficiency improvements, electrification, and emission reduction technology ppgrades |
| Financial and Reputational Risks | Using Green Finance Policies, ESG Rating Requirements, and Investor Climate Disclosure Standards as Key Benchmarks | Banks and financial institutions are gradually incorporating carbon emission levels and decarbonization plans as core evaluation criteria in financing requirements. High-emission projects may face stricter restrictions in loan approval, credit limits and loan terms. | A high-carbon energy structure may affect access to international financing channels. | International capital is adopting a more cautious approach toward high-emission mining projects. | Short to medium term | 1.Improve the Quality of Climate-Related Information Disclosure<br>2.Establish Climate-Related kpis and Ensure Continuous Achievement |

# 03. Financial implications of climate transition risks

## Carbon pricing

As carbon market mechanisms continue to develop globally and nationally, rising carbon prices have become one of the most significant transition risks facing companies. In this report, carbon prices are expressed in terms of allowances under national mandatory emissions trading systems. This risk arises from the establishment of compulsory carbon markets requiring covered high-emitting sectors to purchase allowances for emissions exceeding their allocated free quotas in order to comply with overall emissions caps.

We define different levels of policy tightening based on the three IEA scenarios (CPS, STEPS and NZE), incorporating projected shadow carbon price trajectories and combining them with current and expected domestic carbon price developments in China and Indonesia. This approach is intended to reflect potential financial exposure under different transition pathways.

To ensure consistency between scenario analysis and our actual operating environment, carbon price assumptions for our China operations are anchored to prevailing transaction prices in the national mandatory carbon market. These baseline prices are then linearly extrapolated in line with the directional trends of shadow carbon prices under the WEO 2025 scenarios for 2035, 2040 and 2050 to estimate medium- to long-term allowance price trajectories. The resulting assumptions are used solely to assess potential transition risk impacts and do not represent official government projections or the Company's actual compliance costs. We will continue to monitor carbon pricing policies and market developments and adjust our assumptions and modelling approach as appropriate.

Based on the development of mandatory carbon market policies and market expectations in our key operating regions, we apply a range-based assumption for future allowance prices and analyse their evolution under the three transition scenarios. Under these scenarios, carbon allowance prices are estimated to reach approximately USD 10–30 per tonne in China and USD 4–12 per tonne in Indonesia by 2030. By 2040, as allowance caps tighten and compliance requirements strengthen, prices could increase to approximately USD 14–38 per tonne in China and USD 4–20 per tonne in Indonesia. By 2050, under varying levels of decarbonisation ambition, allowance prices may rise further to approximately USD 14–48 per tonne in China and USD 4–43 per tonne in Indonesia.

These assumptions are used for scenario analysis and stress testing purposes only and do not represent forecasts of future regulatory pricing or the Company's actual compliance expenditures.


## Energy transition (direct procurement of renewable electricity)

As countries accelerate energy system transformation and strengthen scope 2 emissions reduction requirements, companies may face the risk that renewable electricity procurement carries a premium relative to conventional fossil-based power.

In this analysis, we assume that, in response to customer decarbonization requirements and evolving policy trends, the Company will progressively procure renewable electricity in China. The environmental attributes of such procurement may take the form of green power purchase agreements or renewable energy certificates. Future green electricity premiums are projected under different policy scenarios.

The green premium assumptions are informed by the three policy scenarios in the IEA World Energy Outlook 2025 (CPS, STEPS and NZE), particularly the projected evolution of the cost differential between fossil-based and renewable power. These projections are further adjusted using domestic market forecasts to reflect local conditions. According to data published by the Beijing Power Exchange Centre, the current green electricity premium within the State Grid operating region ranges from approximately RMB 20.53 to RMB 105.52 per MWh. In Ningxia, Fujian, Chongqing, Tianjin, Shanghai, Zhejiang and Jiangxi, transaction prices are generally around 20% above the local benchmark coal-fired power tariff. In addition, tight power supply conditions may elevate thermal power market prices, which in turn can contribute to higher green electricity transaction prices.

## Energy transition (investment in renewable power generation)

Against the backdrop of global energy system transformation and increasingly stringent low-carbon procurement requirements from customers, even in regions where coal remains the dominant energy source (such as Indonesia and DRC), the Company may need to proactively invest in renewable energy facilities, such as on-site solar photovoltaic installations. This is intended to reduce emissions associated with the raw material acquisition stage of our products, lower product carbon footprints and maintain supply chain competitiveness.

While such investments may deliver long-term emissions reductions, they are likely to create significant capital expenditure pressure in the short term. This is particularly relevant under transition scenarios where coal prices decline: although fuel costs may decrease, the upfront cost of renewable energy infrastructure remains substantial, potentially resulting in a situation where profitability does not improve despite lower coal prices.

Given the highly globalized nature of the solar photovoltaic industry, key components such as modules, inverters and other major equipment for projects in Indonesia and the DRC would primarily be sourced from established international supply chains, with cost structures broadly comparable to those in the Chinese market. The levelized cost of electricity (LCOE) for solar PV disclosed in the IEA World Energy Outlook 2025 for China represents one of the most mature and cost-competitive benchmarks globally and therefore provides a relevant reference point. Accordingly, the LCOE values published by the IEA for China are used as baseline parameters in our modelling for Youshan Nickel, KMSA, CCR and CCM.

| Region | Scenario | 2035(USD/kWh) | 2050(USD/kWh) |
|---|---|---|---|
| Indonesia / DRC | CPS | 0.0300 | 0.0250 |
| Indonesia / DRC | STEPS | 0.0300 | 0.0250 |
| Indonesia / DRC | NZE | 0.0350 | 0.0300 |

To ensure consistency and comparability in assessing climate-related risks and opportunities, we define "likelihood" as the probability that a given risk or opportunity will have a financial impact on the Company within the reporting period. Likelihood is classified into three levels: low, medium and high, as defined below.

| Level | Qualitative description | Definition |
|---|---|---|
| Low | Highly unlikely or rare | The risk or opportunity has rarely occurred and has not previously resulted in a financial impact on the company; it is not expected to occur within the foreseeable time horizon. |
| Medium | Possible but infrequent | The risk or opportunity has a reasonable probability of occurring and may occasionally affect specific business units or a single financial year. |
| High | Highly likely or frequent | The risk or opportunity has a high probability of occurrence, has occurred repeatedly in current or historical operations, or is expected to occur frequently or persistently, with significant financial implications. |

Risk severity is determined based on quantified financial impact. We define risks with an estimated revenue impact below 5% as low severity; such risks have limited financial impact and can generally be absorbed through routine management without materially affecting profitability. Risks with an estimated revenue impact between 5% and 10% are classified as medium severity; while manageable, they require adjustments to energy structure, investment or procurement strategies and may affect margins in certain business units. Risks with an estimated revenue impact exceeding 10% are classified as high severity; absent effective mitigation measures, such risks could materially weaken overall profitability and therefore require prioritized management within annual budgeting and long-term capital planning.

## Financial impact of transition risks

| Risk name | CPS | | | | | | STEPS | | | | | | NZE | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Matrix Indicators | like lihood | | | severity | | | like lihood | | | severity | | | like lihood | | | severity | | |
| Target Year | 2030 | | | | | | | | | | | | | | | | | |
| Risk Name | low | medium | high | low | medium | high | low | medium | high | low | medium | high | low | medium | high | low | medium | high |
| Policy risk (rising carbon prices) | ■ | | | ■ | | | ■ | ■ | | ■ | | | ■ | ■ | ■ | ■ | ■ | |
| Energy transition risk (green power procurement premium) | ■ | | | ■ | | | ■ | ■ | | ■ | | | ■ | ■ | ■ | ■ | | |
| Energy transition risk (on-site solar investment) | ■ | | | ■ | ■ | | ■ | ■ | | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | |
| Customer low-carbon product demand | ■ | ■ | | ■ | | | ■ | ■ | | ■ | | | ■ | ■ | ■ | ■ | | |
| Reputational risk | ■ | | | ■ | | | ■ | ■ | | ■ | | | ■ | ■ | ■ | ■ | | |

| Risk name | CPS | | | | | | STEPS | | | | | | NZE | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Matrix Indicators | like lihood | | | severity | | | like lihood | | | severity | | | like lihood | | | severity | | |
| Target Year | 2040 | | | | | | | | | | | | | | | | | |
| Risk Name | low | medium | high | low | medium | high | low | medium | high | low | medium | high | low | medium | high | low | medium | high |
| Policy risk (rising carbon prices) | ■ | ■ | | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Energy transition risk (green power procurement premium) | ■ | ■ | | ■ | | | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ |
| Energy transition risk (on-site solar investment) | ■ | ■ | | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | |
| Customer low-carbon product demand | ■ | ■ | | ■ | | | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ |
| Reputational risk | ■ | ■ | | ■ | | | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ |

| Risk name | CPS | | | | | | STEPS | | | | | | NZE | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Matrix Indicators | like lihood | | | severity | | | like lihood | | | severity | | | like lihood | | | severity | | |
| Target Year | 2050 | | | | | | | | | | | | | | | | | |
| Risk Name | low | medium | high | low | medium | high | low | medium | high | low | medium | high | low | medium | high | low | medium | high |
| Policy risk (rising carbon prices) | ■ | ■ | | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Energy transition risk (green power procurement premium) | ■ | ■ | | ■ | | | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ |
| Energy transition risk (on-site solar investment) | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Customer low-carbon product demand | ■ | ■ | | ■ | | | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ |
| Reputational risk | ■ | ■ | | ■ | | | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ |

*The commercial viability, cost trajectory and operational applicability of advanced low-carbon technologies remain subject to significant uncertainty. As such, the company is currently unable to reliably quantify their potential financial impact. A more robust assessment of implications for capital expenditure and production costs will be undertaken as industry technologies mature and additional investment data becomes available.

*The company considers customer low-carbon demand risk and reputational risk to be closely interrelated, both arising from shifting market preferences driven by energy transition dynamics and tightening policy frameworks. Their financial implications are reflected, to a significant extent, in the quantified results presented under energy transition and policy risk scenarios.

## analysis

**transition risk scenario analysis for 2030**

**CPS scenario**

Under the CPS scenario, countries advance the energy transition primarily on the basis of existing policies and regulatory frameworks, with limited introduction of additional constraints. Overall policy and market momentum remains moderate. By 2030, the Company faces lower transition pressure compared with the STEPS and NZE scenarios, and overall risk levels remain relatively low.

In terms of carbon pricing, the expansion of the national emissions trading system and the increase in the share of auctioned allowances progress at a relatively measured pace. Carbon prices remain at comparatively low levels, with limited impact on operating costs. For renewable electricity, market-based green power trading develops steadily, but premium levels remain modest, resulting in limited pressure on energy costs. Regarding on-site solar investment, deployment is primarily driven by long-term cost optimization and strategic planning rather than regulatory compulsion. In the absence of stringent policy drivers, implementation remains cautious. Although Youshan Nickel, KMSA, CCR and CCM face constraints related to weak power infrastructure, the short-term incentive for large-scale capital deployment remains limited.

Customer low-carbon demand evolves gradually, and downstream procurement and carbon footprint management requirements develop at a relatively slow pace, generating limited binding constraints on supply chain access. From a reputational perspective, industry-wide green standards remain fragmented and societal scrutiny is moderate; failure to meet certain low-carbon expectations is unlikely to result in material business or brand impacts in the near term.

Overall, under the CPS scenario, both the likelihood and financial severity of transition risks remain low through 2030, with limited impact on core operating performance.

**STEPS scenario**

Under the STEPS scenario, policy and market momentum for the energy transition strengthens progressively. Carbon pricing mechanisms, renewable electricity markets and customer low-carbon standards become more structured and effective, leading to moderate transition pressure on the Company by 2030.

With the expansion of carbon market coverage and the gradual increase in auctioned allowances, the likelihood of rising carbon costs increases to a medium level. However, given policy implementation pacing and market supply-demand dynamics, near-term carbon price increases remain moderate, and the financial severity remains low to moderate.

For renewable electricity, direct procurement mechanisms and renewable certificate trading become more widely adopted, and green power premiums trend upward. Nevertheless, given the Company's target of achieving approximately 20% renewable electricity coverage by 2030, associated cost impacts remain manageable.

Regarding on-site solar investment, stronger cost optimization incentives and regulatory expectations increase the likelihood of implementation to a medium level. Given the scale of required capital expenditure, such investments may exert pressure on cash flow and capital structure, resulting in medium financial severity.

Customer low-carbon procurement standards and supply chain carbon management requirements become clearer, but have not yet fully translated into binding market access conditions, limiting revenue-side impacts in the near term. Reputational exposure increases as regulatory frameworks mature and public scrutiny intensifies, although core operating performance remains largely unaffected.

Overall, under the STEPS scenario, transition risks through 2030 are assessed at a moderate level. While they impose constraints on earnings and capital allocation, they remain within a range that can be addressed through proactive management and forward-looking strategic planning.

**NZE scenario**

Under the NZE scenario, net zero objectives accelerate across sectors. Tightening carbon pricing mechanisms, rapid clean energy deployment and strengthened customer low-carbon standards significantly increase the likelihood of policy, market, technology and reputational risks prior to 2030.

However, from a financial perspective, the impact of these external constraints before 2030 is more gradual. Carbon price increases and renewable electricity premiums remain relatively contained in the short term, and customer low-carbon requirements have not yet fully translated into material revenue losses. As a result, while the likelihood of transition risks is high, overall financial severity remains low in the near term.

By contrast, on-site solar investment becomes a more critical lever under the NZE pathway for reducing energy costs and enhancing low-carbon capability. In Indonesia and the DRC, where power infrastructure is weak and electricity demand is substantial, achieving meaningful substitution would require large installed capacity and significant capital expenditure. As such, although the likelihood of investment is high, the direct impact on cash flow and capital expenditure is more pronounced, and the financial severity of this risk is assessed as medium.

## Transition risk scenario analysis for 2040

**CPS scenario**

Under the CPS scenario, countries continue to advance the energy transition primarily on the basis of existing climate policies and regulatory frameworks, with limited introduction of additional constraints. The overall pace of transition remains relatively gradual. By 2040, the Company's transition exposure remains lower than under the STEPS and NZE scenarios, with risks generally assessed at low to moderate levels.

Carbon market expansion and the increase in auctioned allowances proceed at a measured pace, with carbon prices remaining relatively moderate and exerting limited pressure on operating costs. Renewable electricity markets continue to develop, but green power premiums remain manageable, resulting in limited impact on energy expenditure. Investment in on-site solar remains largely driven by internal cost optimization and long-term strategic planning; in the absence of binding regulatory requirements, implementation progresses in a disciplined manner.

Downstream customer low-carbon procurement requirements evolve gradually and impose limited constraints on revenues. Industry-wide green standards remain fragmented, and the influence of environmental performance on brand perception and capital market evaluation remains moderate. Overall, under the CPS scenario, transition risks through 2040 remain within a manageable range, with limited impact on core operating capabilities.

**STEPS scenario**

Under the STEPS scenario, energy transition policies deepen progressively. Carbon pricing mechanisms, renewable electricity markets and low-carbon supply chain management systems become more robust, resulting in sustained moderate-to-elevated transition pressure on the Company by 2040.

As carbon market coverage expands and the share of auctioned allowances continues to increase, carbon prices rise steadily. Carbon costs become progressively embedded in production and operating activities, placing structural pressure on profit margins. Direct procurement of renewable electricity and renewable certificate trading become more widespread, and green power premiums exhibit periodic increases, exerting ongoing influence on energy costs.

To mitigate long-term energy and compliance risks, the Company is likely to expand its clean energy portfolio further. Investment in on-site solar and related infrastructure increases over time, placing moderate pressure on cash flow and capital structure. Downstream sectors increasingly incorporate emissions performance and product carbon footprint metrics into procurement decisions, creating market constraints for higher-carbon products. At the same time, stricter regulation and rising public scrutiny enhance the linkage between environmental performance, external evaluation and financing conditions.

Overall, under the STEPS scenario, transition risks through 2040 are assessed at a moderate-to-high level, creating sustained constraints on cost structure and capital allocation.

**NZE scenario**

Under the NZE scenario, national net zero commitments are comprehensively implemented across energy and industrial systems. Carbon pricing, structural energy adjustments and low-carbon supply chain requirements are strengthened in parallel, resulting in significantly higher transition pressure than under CPS and STEPS.

Allowance caps tighten continuously and the share of auctioned allowances increases materially, with carbon prices remaining elevated. Carbon costs become a key determinant of operating performance. Demand for clean energy rises sharply, competition for renewable electricity intensifies and green power premiums increase significantly, creating sustained upward pressure on energy costs.

To ensure energy security and manage long-term carbon exposure, the Company would need to accelerate investment in clean energy infrastructure. On-site solar and associated storage projects would require substantial expansion, placing considerable pressure on capital expenditure and funding arrangements. Downstream sectors implement comprehensive low-carbon access standards, and product carbon footprint performance directly influences order acquisition. Environmental performance becomes closely linked to brand value and capital market perception; inadequate response could materially affect financing capacity and competitive positioning.

Overall, under the NZE scenario, transition risks through 2040 are assessed as high in likelihood and moderate to high in financial severity, requiring systematic adjustments to operating models and long-term strategy.



## Transition risk scenario analysis for 2050

The year 2050 represents both the strategic end point of the Paris Agreement's net zero objective and the target year for the Company's own net zero ambition. By this stage, low-carbon standards across industries are expected to be largely harmonized, and transition pressures arising from policy, markets, supply chains and reputation are likely to be fully reflected.

**CPS scenario**

Although the overall pace of the energy transition remains comparatively moderate under the CPS pathway, the gradual phase-out of free allowances and the full inclusion of energy-intensive sectors in carbon markets increase both the likelihood and financial impact of rising carbon prices relative to 2040.

Green power procurement premiums may ease to some extent as renewable energy and storage scale up, but price volatility may persist. Investment in on-site solar continues, primarily to stabilize the long-term energy cost structure, creating moderate pressure on capital expenditure. Customer low-carbon requirements and reputational considerations become normalized; failure to meet product-level low-carbon standards may affect certain orders.

Overall, under the CPS scenario, transition risks through 2050 are assessed at a moderate to moderately high level, placing sustained constraints on operating costs and compliance capability.

**STEPS scenario**

Under the STEPS pathway, energy transition policies deepen further and carbon market mechanisms mature. Energy-intensive sectors are fully integrated into emissions trading systems, with auctioned allowances becoming the dominant allocation mechanism. Both the likelihood and severity of carbon price increases reach high levels, placing material pressure on operating costs.

Demand for green electricity procurement continues to expand. Although technological progress partially offsets cost increases, regional disparities and competition for renewable resources result in persistently elevated green premiums. Investment in on-site solar and related infrastructure continues to expand, exerting moderate to moderately high pressure on cash flow and capital structure.

Low-carbon access standards in downstream industries become firmly embedded, and carbon performance directly influences order acquisition. Reputational exposure becomes closely linked to ESG performance.

Overall, under the STEPS scenario, transition risks through 2050 are assessed as high in likelihood and moderate to high in financial severity.

**NZE scenario**

Under the NZE pathway, national net zero commitments are fully implemented. Carbon pricing, structural energy adjustments and low-carbon supply chain requirements are strengthened simultaneously, resulting in the highest level of transition pressure.

Carbon prices remain structurally elevated over the long term. Combined with renewable electricity costs and substantial clean energy investment requirements, this materially increases unit production costs. Investment in on-site solar, storage and related infrastructure expands significantly, creating sustained pressure on capital expenditure. Downstream customers universally implement stringent low-carbon access standards, and carbon performance becomes a core competitive factor. Reputational risk becomes closely linked to long-term corporate viability.

Absent substantive decarbonization progress, the Company could face structural cost disadvantages, loss of orders and erosion of market position, with systemic implications for profitability and long-term growth.



It is important to note that while renewable electricity procurement and on-site solar investment increase operating and capital costs in the short term, both measures can partially offset the financial burden of rising carbon prices over the long term. As the share of clean electricity in the Company's energy mix increases, demand for carbon allowances declines, leading to a reduction in carbon compliance costs. From an integrated financial perspective, low-carbon energy investment therefore represents both a cost driver and a structural hedge against long-term policy risk.

Customer low-carbon demand risk and reputational risk have been incorporated into the broader assessment of energy and policy transition risks in this evaluation. Advanced low-carbon technologies remain at an early stage of commercialization; due to limited comparable financial data, quantitative assessment is not currently feasible. Their impact on capital expenditure and production costs will be reassessed as technologies mature and industry benchmarks become clearer.

Overall, under the current assumptions, the Company may face moderate carbon pricing and energy transition cost pressures in the near term. However, as renewable energy costs decline and internal carbon management mechanisms strengthen, long-term financial risks are expected to remain manageable. Investment in low-carbon energy and renewable electricity procurement will serve as key mitigation pathways in responding to tightening policy frameworks and accelerating market decarbonization.

# Assets and Portfolio

CHAPTER 06

CHENGTUN MINING

## Low-carbon transition opportunities

We are actively identifying and assessing the key opportunities available to us under different energy transition and climate scenarios. These include renewable energy substitution, resource efficiency improvements, green product development, and market expansion. Through forward-looking positioning and strategic investment, we aim to unlock new growth avenues and business models in the global transition to carbon neutrality, ensuring that we maintain our capacity for innovation, market competitiveness, and long-term value creation amid structural industry change.

- Climate transition opportunityidentification and assessment methodology
- Focus on critical metals
  a. Copper: the foundational metal for electrification
  b. Nickel: policy-driven growth in battery materials
  c. Cobalt: a strategically scarce metal in the age of electrification
- Strategic alignment with climate transition opportunities
- Current and future investment portfolio

## Building a low-carbon metals value chain in the energy transition

Our strategic focus is to responsibly and efficiently manage our integrated value chain across key transition metals, including copper, cobalt and nickel. By strengthening linkages between resource development and downstream processing, and by advancing technological upgrades and green investment, we aim to enhance resilience and deliver sustainable value while supplying the materials required for global decarbonization.

We align our growth strategy with internationally recognized principles of sustainable development. As we expand our operations, we seek to balance business growth with environmental stewardship and positive community impact. Our objective is to be a trusted partner in the new energy metals sector, delivering long-term value to customers, employees, shareholders and the communities in which we operate.

In the context of global net-zero commitments, copper, cobalt and nickel are increasingly critical to electrification and low-carbon transport. Copper is essential for grid expansion and energy storage infrastructure. Nickel is a key input for high energy-density batteries. Cobalt plays an important role in enhancing battery safety and performance. To capture these structural opportunities, we are strengthening our positioning through geographic diversification and operational upgrades:

**DRC**

expanding copper and cobalt mining and primary processing capacity to reinforce our resource base in Africa.

**Indonesia**

advancing high-grade nickel matte and ferronickel projects to support regional battery supply chains.

**China**

optimizing smelting processes and improving energy efficiency, supported by renewable power procurement and fuel switching to reduce operational emissions.

**Group-wide**

advancing product carbon footprint accounting to enhance transparency and strengthen market recognition.

To maintain strategic alignment with the transition, we closely monitor developments in global energy markets, carbon pricing trends and technological innovation. The results of our climate scenario analysis are progressively integrated into strategic planning, capital allocation and risk management processes. Management and the board regularly review these assessments to ensure that investment decisions and portfolio positioning remain consistent with global decarbonization pathways.

Supported by a prudent financial structure, flexible investment mechanisms and a developing climate governance framework, we are positioned to identify and respond to emerging transition opportunities. This approach enables us to advance industrial upgrading and value chain integration, while delivering sustainable growth and long-term value creation.

ASSETS AND

INVESTMENT PORTFOLIO

# 01. Methodology for identifying and assessing climate transition opportunities

We have established a structured process to identify and assess climate-related opportunities. Using scenario analysis as our primary analytical tool, we draw on the International Energy Agency's "World Energy Outlook 2025" and "Global Critical Minerals Outlook 2025" to evaluate potential developments in energy systems, carbon pricing trajectories, demand for critical minerals and the evolution of low-carbon technologies under different transition pathways.

For our overall transition risk assessment, we primarily apply the CPS, STEPS and NZE scenarios set out in World Energy Outlook 2025. For the assessment of critical minerals and new energy value chain opportunities, we complement this analysis with the STEPS, APS and NZE scenarios referenced in "Global Critical Minerals Outlook 2025" to evaluate medium- to long-term demand potential. Scenario selection is aligned with the respective scope and publication timing of each report and does not imply any substantive inconsistency between scenario assumptions.

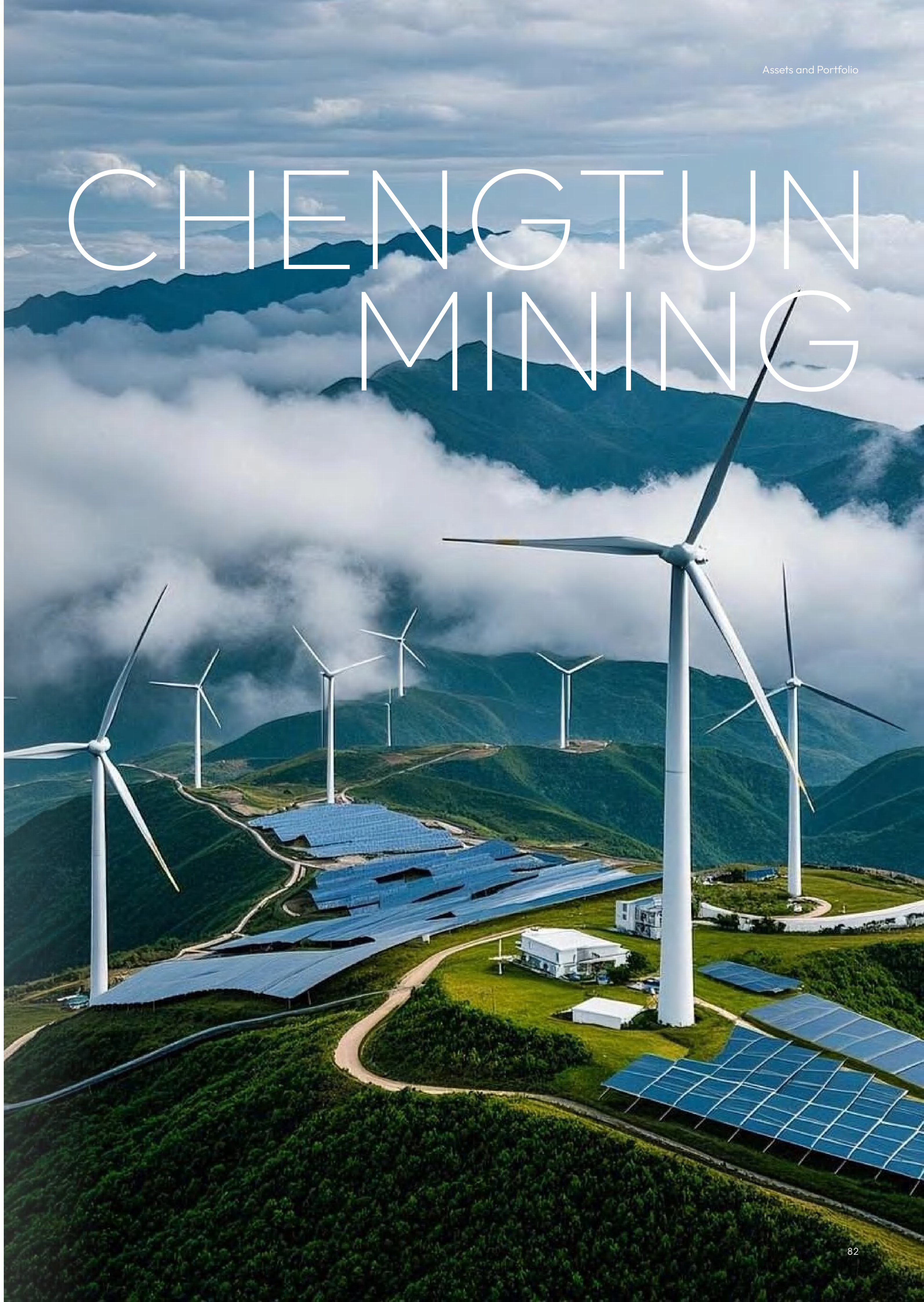
Our approach to identifying climate-related opportunities is consistent with the framework used for transition risk assessment. The distinction lies in the analytical focus: in addition to potential adverse impacts, we assess the potential upside arising from structural shifts in the energy system, including changes in the energy mix, the deployment of clean technologies, increasing demand for low-carbon products and the emergence of green finance and policy incentives.

Through scenario analysis, we assess the pace of global energy transition and projected trends in demand for key metals. This enables us to identify growth areas that may create strategic value under different transition pathways. Relevant considerations are progressively integrated into strategic planning, capital allocation and sustainability management processes. Opportunity identification and analysis are conducted with reference to operational data across business segments, energy consumption profiles and evolving market dynamics.

The results of these assessments serve as key inputs to strategic planning and investment evaluation, supporting decision-making in areas such as resource development, energy mix optimization and technology upgrades. Looking ahead, we intend to further strengthen internal governance processes related to climate matters, with the objective of embedding risk and opportunity assessments more systematically into strategy and capital allocation.







# 02. Focus on Critical Metals

In the global transition toward carbon neutrality, copper, nickel and cobalt are widely regarded as fundamental raw materials supporting the energy transition. They are key components in the manufacturing of clean energy equipment, electric vehicles and energy storage systems, and are also irreplaceable strategic metals for modern power, communication and industrial systems. According to the International Energy Agency (IEA), the decarbonization of energy systems will significantly increase global dependence on critical minerals, with demand for copper, nickel and cobalt growing much faster than that of traditional metals.

## The roles of these three metals are distinct yet closely interconnected:

**Copper** the core metal of an electrified society. Every megawatt of solar or wind power capacity, every kilometer of transmission and distribution lines, and every electric vehicle motor and charging infrastructure rely on copper's electrical conductivity.

**Nickel** a critical material for high-energy-density batteries and a key component of lithium-ion battery cathodes, directly influencing the driving range and cost of electric vehicles.

**Cobal** plays a vital role in improving battery safety and stability, and is also widely used in aerospace alloys and high-performance electronic components.

As countries accelerate the transition of their energy structures, global demand for low-carbon metals such as copper, nickel and cobalt is entering a new growth cycle. According to IEA projections, under the Net Zero Emissions (NZE) scenario, total global demand for critical minerals is expected to double by 2030 compared with 2022, with copper, nickel and cobalt experiencing the most significant growth.

For the Company, this trend not only represents a reshaping of the industry landscape but also signals new growth opportunities. Over the years, the Company has developed an integrated industrial chain covering the exploration, development and smelting of copper, nickel and cobalt resources. This strategic layout is highly aligned with the global energy transition and provides a solid foundation for achieving sustained growth in the low-carbon economy era.



## Copper: a foundational metal for electrification

### 1. Global energy transition trends

According to the International Energy Agency's "Global Critical Minerals Outlook 2025", based on currently operating and announced projects under the baseline scenario, global copper mine production increased from approximately 19 Mt in 2015 to around 23 Mt in 2024. Output is projected to reach approximately 23–24 Mt around 2030, before declining to around 15 Mt by 2040 due to resource constraints and project development timelines.

Over the same period, copper mine production in the Democratic Republic of the Congo increased from approximately 1.5 Mt in 2015 to around 2.5 Mt in 2024, and is projected to exceed 3 Mt by 2030, making it the world's second-largest copper producer after Chile. Chile's production remains broadly stable in the range of 5–6 Mt, while Peru maintains output at approximately 2 Mt. In 2024, the top three producing countries accounted for approximately 45% of global copper mine supply, rising to around 50% by 2030, indicating a further concentration of resources.

In the refining segment, China's leading position continues to strengthen. Global refined copper production increased from approximately 22 Mt in 2015 to around 27 Mt in 2024 and is projected to reach approximately 34 Mt by 2030, before stabilizing at around 31 Mt by 2040. China's refined copper output rose from approximately 7 Mt in 2015 to around 12 Mt in 2024, and is expected to reach approximately 16 Mt by 2030, representing close to 50% of global output. By 2040, production is projected to remain at approximately 15 Mt, accounting for around 45% of global supply. In comparison, Japan, India, Russia and Indonesia together are expected to maintain a combined share of approximately 10%–15%, reinforcing China's central role in the global refining system.

Overall, between 2024 and 2040, the global copper industry is expected to exhibit increasing geographic differentiation, with upstream resources becoming more concentrated in Africa and refining capacity remaining in China. The Democratic Republic of the Congo's share of global mine supply is projected to increase materially by 2030 compared with 2015 levels, while refining concentration in China continues to shape value chain integration.

Against the backdrop of accelerating energy transition and growth in new energy industries, these structural shifts in supply provide a clearer development pathway for our copper business. Expansion of mine capacity in the Democratic Republic of the Congo supports greater security of raw material supply, while the scale and efficiency of China's refining sector create conditions for integrated mine-to-metal operations and cost optimization. As copper demand increasingly concentrates in grid expansion, renewable energy systems and electric mobility, companies with secure resource access and established processing capabilities are positioned to maintain competitive strength over the medium to long term.

**Demand:** Construction, grids, industrials and EVs drive growth in copper demand with Chinathe leading demand driver, though new major demand centres emerge in India and Viet Nam

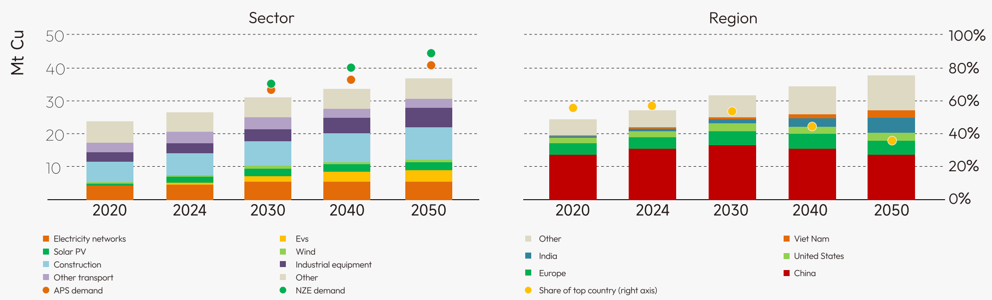



Figure: Copper demand by sector and by region, selected years
Soruce: Global Critical Minerals Outlook 2025, IEA

**Supply:** The DRC cements itself as the second-largest copper mining producer after Chile,while China maintains its dominance in copper refining
Copper production from operating and announced projects in the base case

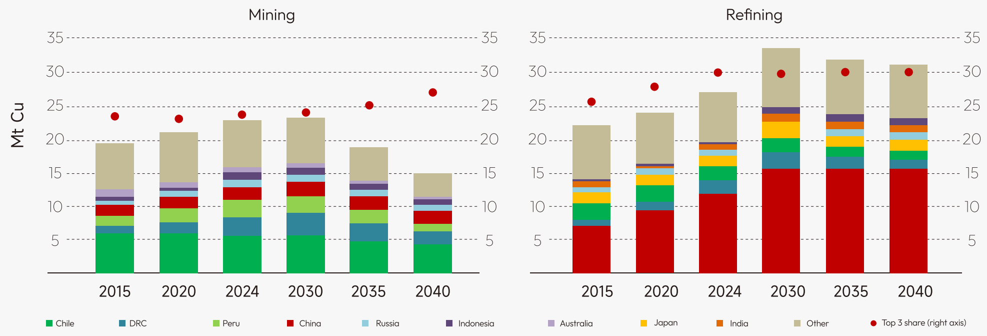



Figure: Copper demand by sector and region under selected scenarios and years
Soruce: Global Critical Minerals Outlook 2025, IEA

## 2. Changes in the copper supply–demand balance under the energy transition

According to the International Energy Agency's "Global Critical Minerals Outlook 2025", based on existing and announced projects, global mined copper supply is expected to reach a cyclical peak around 2030 before gradually declining. Global mine production is projected to increase from approximately 23 Mt in 2024 to around 25–26 Mt by 2030, before falling to approximately 22 Mt in 2035 and further to around 17 Mt by 2040. This trajectory reflects structural constraints in bringing new high-quality resources and replacement capacity online under current project pipelines.

On the demand side, primary copper demand remains elevated across transition scenarios as energy systems decarbonize. Under the STEPS scenario, demand is projected at approximately 27 Mt in 2030 and 2035, and remains close to 26 Mt by 2040. Under the APS scenario, demand increases to approximately 28 Mt in 2030 and 2035, and remains around 27 Mt in 2040. Under the NZE scenario, demand rises further, reaching approximately 30 Mt in 2030, exceeding 32 Mt in 2035, and remaining above 30 Mt in 2040.

Comparing supply and demand, imbalances begin to emerge around 2030 and widen thereafter. Under a baseline supply outlook, mine production in 2035 is projected at approximately 22 Mt, while demand under the STEPS scenario reaches around 27 Mt, implying a shortfall of nearly 5 Mt. Under the NZE scenario, the gap widens to more than 7 Mt. By 2040, under the NZE pathway, the supply–demand gap is projected to exceed 10 Mt, indicating sustained structural tightness in copper markets over the medium to long term.

Overall, in the context of accelerating energy transition and continued growth in clean energy investment, copper demand is expected to remain structurally strong. At the same time, long project lead times and increasing geological and regulatory constraints limit the pace of new mine development. These dynamics are likely to provide long-term support to copper prices and reinforce the competitive positioning of companies with secure resource bases and established production capacity, creating sustained market opportunities for our copper business.

Mined copper supply from existing and announced projects and primary supply requirements by scenario

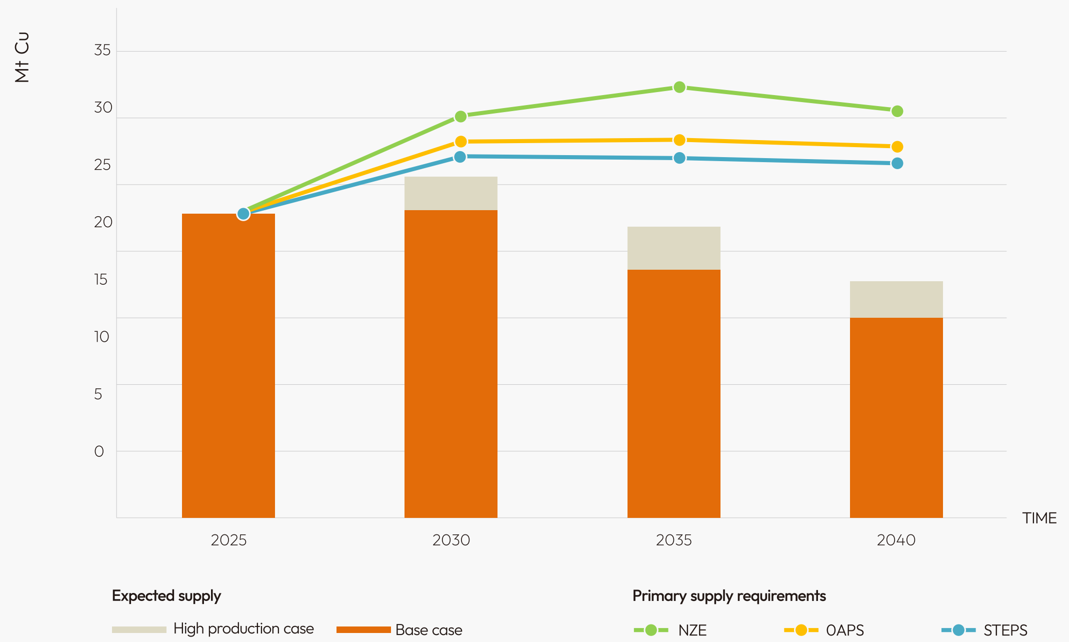



Figure: Comparison of copper demand under different transition scenarios
Source: Global Critical Minerals Outlook 2025, IEA

## 3. Growth in recycled copper supply

Under the STEPS scenario assessed in the International Energy Agency's "Global Critical Minerals Outlook 2025", recycled copper is expected to play an increasingly important role in the global supply system as collection networks expand and circular economy practices mature.

Total secondary copper supply is projected to increase from approximately 11 Mt in 2024 to around 15 Mt by 2030, rising further to about 20 Mt in 2040 and reaching approximately 27–28 Mt by 2050. Within this total, secondary refined copper produced from scrap through recycling processes is expected to grow from roughly 4–5 Mt in 2024 to approximately 12 Mt by 2050. Direct use of scrap is projected to increase from around 6 Mt to more than 15 Mt over the same period, becoming a key contributor to overall recycled supply growth.

In terms of demand coverage, recycled copper is expected to account for a growing share of total copper requirements. On a demand basis that excludes direct scrap use, recycled supply is projected to increase from approximately 12% of global copper demand in 2024 to around 18% by 2030, close to 25% by 2040 and approximately 33% by 2050. This indicates that circular supply chains will partially alleviate pressure on primary mine production and contribute to greater stability in the overall supply structure.

However, even under scenarios of rapid growth in recycled copper, secondary supply is unlikely to fully offset the decline in primary mine output over the medium to long term. Recycled copper availability depends on the maturity of collection systems, end-of-life product cycles and process recovery rates, which impose practical limits on short- to medium-term expansion.

In the context of accelerating decarbonization and the transition towards a circular economy, the expansion of recycled copper presents strategic opportunities for our business. By strengthening recycling networks and enhancing the integration of secondary materials into our operations, we can diversify raw material sources, improve supply resilience and reinforce our competitive position within a lower-carbon metals value chain.

Secondary supply copper outlook in the STEPS

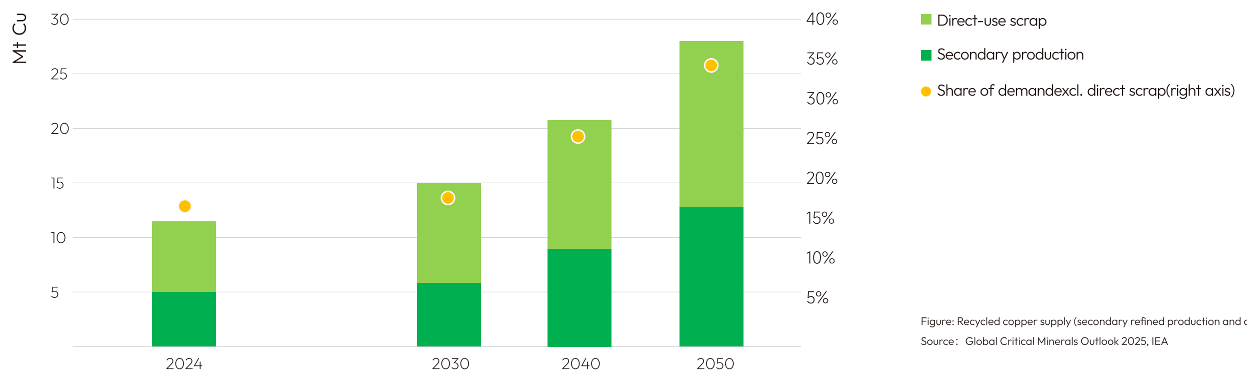
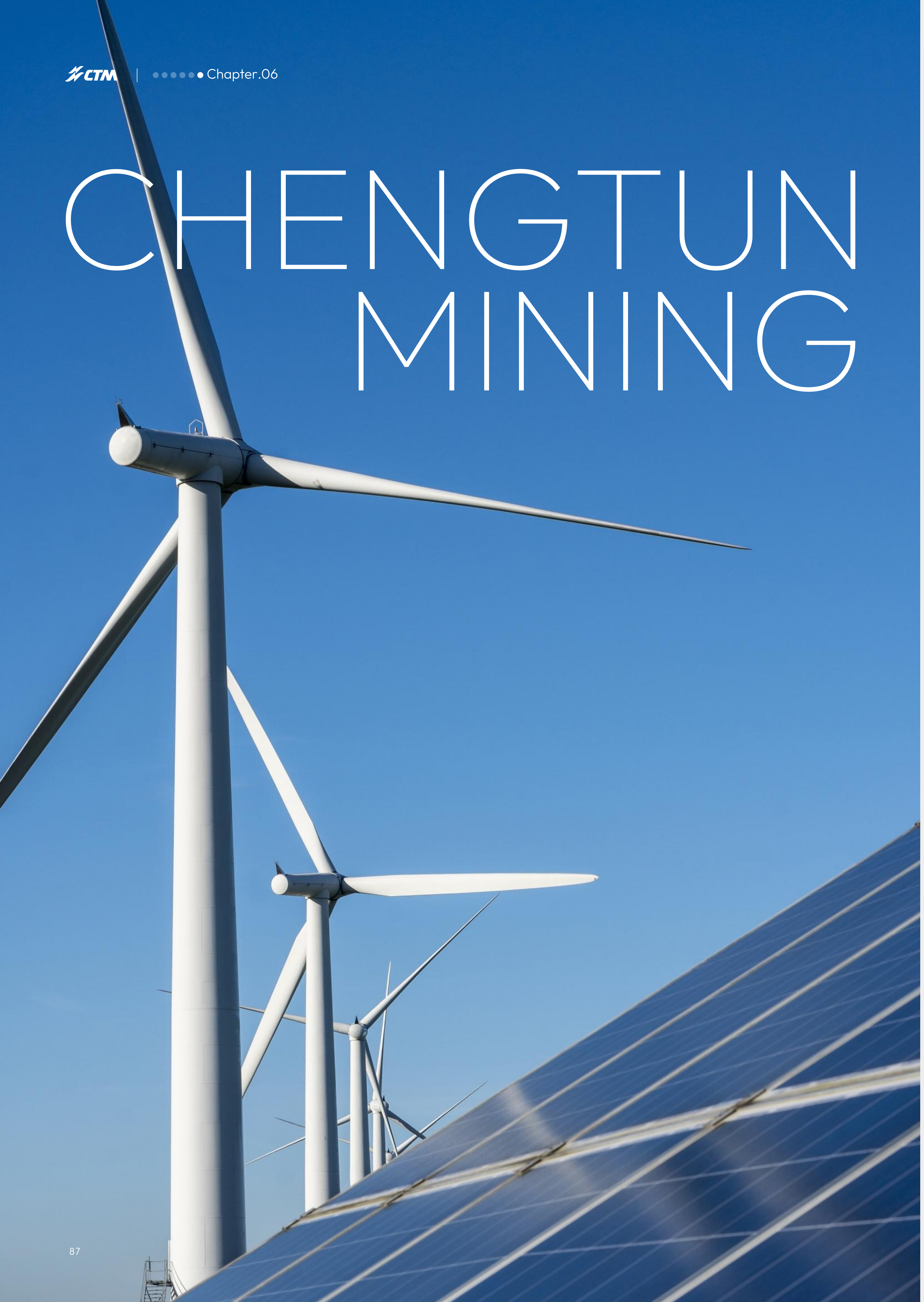



Figure: Recycled copper supply (secondary refined production and direct scrap use)
Source: Global Critical Minerals Outlook 2025, IEA








## Nickel: demand growth trends and structural shifts

### 1. Global electrification trends

According to the International Energy Agency's Global Critical Minerals Outlook 2025 under the STEPS scenario, global nickel demand is projected to increase significantly over the coming decades, primarily driven by applications related to the energy transition.

In aggregate terms, global nickel demand rises from approximately 2 300 kt in 2020 to around 4 300 kt by 2030, reaching approximately 5 700 kt in 2040 and about 6 300 kt by 2050 — nearly double the 2020 level. Under higher-ambition scenarios such as APS and NZE, demand in 2050 increases further to approximately 7 000–7 500 kt, indicating that deeper decarbonization pathways would continue to strengthen demand for nickel resources.

**From a sectoral perspective, new energy applications represent the primary source of incremental demand:**

- Nickel demand for electric vehicle batteries shows the most pronounced growth, increasing from less than 200 kt in 2020 to approximately 1000 kt by 2030, around 1 600 kt by 2040 and exceeding 2000 kt by 2050, becoming the dominant source of additional demand.
- Stainless steel and alloy applications continue to grow steadily, reaching a combined demand of approximately 2 500–3 000 kt by 2050, and remain the foundational component of overall nickel consumption.
- Renewable energy and hydrogen-related applications, although starting from a smaller base, expand consistently to approximately 400–500 kt by 2050.
- Other traditional industrial uses show moderate growth over the same period.

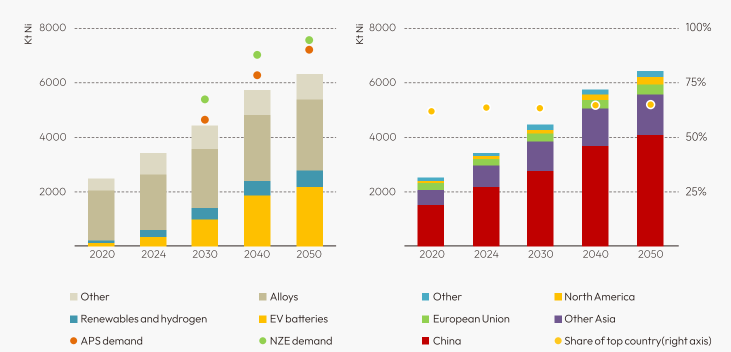
By 2050, batteries, renewable energy systems and related advanced materials account for a materially larger share of total nickel demand, reflecting a structural shift in nickel's role from a predominantly industrial metal to a critical material for low-carbon technologies.

Regionally, nickel consumption remains heavily concentrated in Asia, with China and Indonesia playing central roles:

- China remains the largest global consumer throughout the projection period. Demand increases from approximately 1 500 kt in 2020 to around 2 700 kt in 2030, approximately 3 600 kt in 2040 and more than 4 000 kt by 2050, accounting for roughly 60% of global demand over the period.
- Other Asian countries also experience growth, reaching a combined demand of approximately 800–900 kt by 2050.
- North American demand increases from around 300 kt in 2020 to approximately 700 kt by 2050.
- EU demand remains relatively stable in the range of 200–300 kt, with more moderate growth.
- Demand in other regions remains broadly stable in proportional terms.

**Demand:** Growth in nickel demand is driven by energy applications with China as the largestconsumer of primary nickel, followed by Indonesia

Global nickel demand outlook by sector and region in the STEPS




By 2050, China's share of global nickel consumption remains close to 65%, reinforcing its dominant position in the global market.

Overall, against the backdrop of rapid expansion in electric vehicles, battery storage and renewable energy equipment, global nickel demand is expected to maintain a sustained growth trajectory. China and the broader Asian region remain the core consumption markets. The increasing share of new energy applications creates long-term structural opportunities for companies engaged in nickel resource development, processing and downstream integration.

## 2. Nickel supply structure and regional concentration trends

Under the baseline outlook referenced in the International Energy Agency's Global Critical Minerals Outlook 2025, regional concentration across both upstream mining and midstream refining segments of the nickel value chain is projected to increase over time.

### POINT 01 Mining: strengthening dominance of Indonesia

- At the mining level, global nickel production has continued to expand, rising from approximately 2200 kt in 2015 to around 3600 kt in 2024, and projected to reach approximately 4500 kt by 2030.

Indonesia represents the primary source of incremental supply:

- Production increased from less than 200 kt in 2015 to approximately 700 kt in 2020 and around 2500 kt in 2024. Output is projected to exceed 3000 kt by 2030 and approach 3400 kt by 2040. Indonesia's share of global mine supply correspondingly increases from around 15% in 2020 to close to 55% by 2040.
- By contrast, traditional producing regions such as the Philippines, New Caledonia, Canada, Australia and Russia show more limited growth. In several jurisdictions, cost pressures and price volatility have slowed project development, constraining additional supply capacity.

Overall, Indonesia's role within the global nickel resource system continues to strengthen, while geographic diversification at the mining stage declines.

### POINT 02 Refining: emergence of a China–Indonesia dual hub

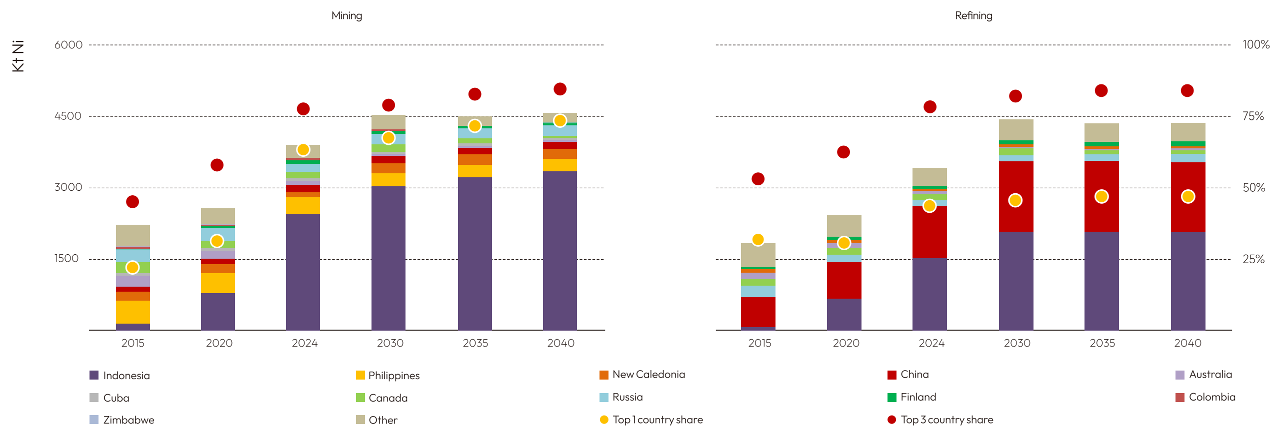
- In the refining segment, global refined nickel production increased from approximately 1 600 kt in 2015 to around 3 300 kt in 2024, and is projected to reach approximately 4400 kt by 2030, stabilizing in the range of 4300–4400 kt by 2040.
- Refining capacity is similarly concentrated. China and Indonesia have become the core processing base. In 2024, combined refined output from the two countries exceeded 2500 kt, representing approximately 75% of global production. By 2030 and beyond, the share of the top three refining countries is projected to remain above 80%, reinforcing Asia's central position in the global processing system.
- Australia, Finland and Russia maintain certain refining capacities, but overall expansion remains limited and insufficient to materially alter the shift of refining activity towards Asia.

### POINT 03 Structural implications of rising concentration

- Taken together, the global nickel supply chain is evolving towards a structure characterized by resource concentration in Indonesia and processing concentration in China and Indonesia. Lower price environments have discouraged investment in higher-cost regions, reducing supply diversification. At the same time, Indonesia has leveraged its resource endowment and expanded domestic processing capacity, strengthening its influence across the value chain.
- By 2040, the global nickel supply system is expected to exhibit a high degree of regional concentration. Security of upstream resources and stability of midstream processing will become increasingly important to downstream new energy industries.
- In the context of sustained growth in demand for battery materials and other clean energy applications, rising supply concentration may increase sensitivity to regional policy, trade conditions and geopolitical factors. At the same time, these dynamics create long-term opportunities for companies with integrated resource access and established value chain positioning.

**Supply:** Geographical concentration for mining and refining increases as projects in diversifiedregions are impacted by low prices

Nickel production from operating and announced projects in the base case



## 3. Nickel supply–demand balance analysis

Under different transition scenarios, the global nickel market is expected to experience a degree of oversupply in the near term. However, as demand from new energy applications continues to expand, supply and demand are projected to move towards tighter balance after 2030, according to the International Energy Agency's Global Critical Minerals Outlook 2025.

From a supply perspective, under the baseline outlook, global nickel mine supply capacity increases from approximately 3.9 Mt in 2024 to around 4.5 Mt in 2030, remains at roughly 4.5 Mt in 2035 and rises modestly to about 4.6 Mt by 2040. Under a high-capacity case, supply potential expands further, reaching approximately 4.6 Mt in 2030, close to 5.2 Mt in 2035 and around 5.5 Mt in 2040.

On the demand side, primary nickel requirements continue to grow across transition pathways:

- Under the STEPS scenario, primary demand increases from approximately 3.4 Mt in 2024 to around 4.2 Mt in 2030, 5.2 Mt in 2035 and approximately 5.6 Mt in 2040.
- Under the APS scenario, demand rises from approximately 3.5 Mt to around 4.7 Mt in 2030, 5.6 Mt in 2035 and approximately 6.0 Mt in 2040.
- Under the NZE scenario, growth is more pronounced, reaching approximately 5.4 Mt in 2030, close to 6.9 Mt in 2035 and remaining around 6.8 Mt in 2040.

**A comparison of supply capacity and primary resource demand indicates the following trends:**

- Between 2024 and 2030, supply capacity under both baseline and high-capacity assumptions is broadly above or close to demand levels, suggesting relatively loose market conditions.
- After 2030, demand growth driven by electric vehicles, battery storage and renewable energy equipment outpaces incremental capacity additions.
- Under more ambitious transition pathways such as APS and NZE, demand approaches or exceeds even high-capacity supply levels after 2035, shifting the market from surplus towards tighter balance.

Overall, the global nickel market exhibits a phased pattern of "near-term surplus and medium- to long-term tightening". In the short term, the release of new capacity may exert downward pressure on prices. Over the longer term, sustained growth in new energy demand is expected to narrow the supply–demand gap, strengthening the competitive position of producers with secure resource access and cost advantages.

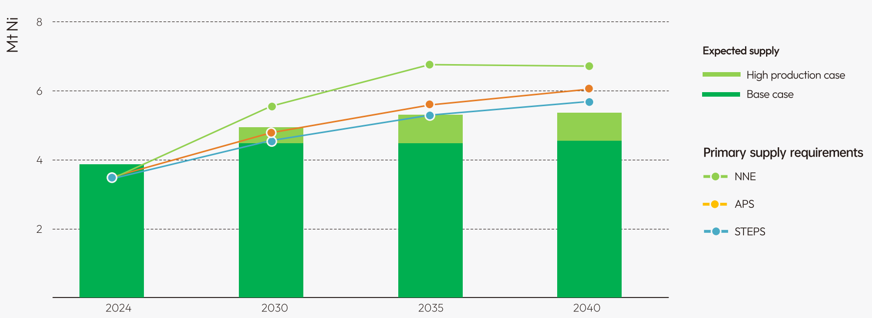



Figure: Comparison of global nickel supply capacity and primary demand under different scenarios
Source: Global Critical Minerals Outlook 2025, IEA





## 4. Recycled nickel value chain

Under the STEPS scenario in the International Energy Agency's Global Critical Minerals Outlook 2025, total global nickel demand continues to expand steadily, rising from 2 825 kt in 2021 to 3 371 kt in 2024, reaching 4 389 kt by 2030 and increasing further to 5 685 kt by 2040 — more than doubling relative to 2021.

From a demand structure perspective, clean energy technologies represent the primary growth driver:

- Nickel demand for clean technology applications increases from 226 kt in 2021 to 562 kt in 2024, reaching 1 349 kt in 2030 and 2 381 kt by 2040.
- The share of clean technology demand in total nickel consumption rises from approximately 8% in 2021 to more than 40% by 2040, becoming the dominant source of incremental demand.
- Demand from other traditional applications grows more gradually, increasing from 2 600 kt in 2021 to 3 304 kt in 2040, at a significantly lower growth rate than clean technology sectors.

On the supply side, primary production continues to account for the majority of nickel supply, while recycled volumes increase but remain comparatively limited:

- Recycled supply rises from 25 kt in 2021 to 62 kt in 2024, remains broadly stable at 63 kt in 2030, and increases to 295 kt by 2040.
- Despite this growth, recycled material accounts for less than 6% of total supply by 2040.
- Primary supply increases from 2 709 kt in 2021 to 5 382 kt in 2040, continuing to bear the main burden of meeting demand growth.

Overall, under the STEPS pathway, the expansion of global nickel demand is driven primarily by clean energy technologies, while recycled supply plays a supplementary but still limited role in the overall balance. The nickel value chain therefore remains highly dependent on primary resource availability over the medium to long term. This structural characteristic underscores the strategic importance of secure access to high-quality mineral resources, well-positioned refining capacity and stable supply chain integration in the development of the nickel industry.

| STEPS scenario | 2021 | 2024 | 2030 | 2040 |
|---|---|---|---|---|
| Clean technology demand (kt) | 226 | 562 | 1349 | 2381 |
| Other demand (kt) | 2600 | 2809 | 3039 | 3304 |
| Total demand (kt) | 2825 | 3371 | 4389 | 5685 |
| Recycled supply (kt) | 25 | 62 | 63 | 295 |
| Primary supply (kt) | 2709 | 3484 | 4326 | 5382 |

Table 1: Nickel supply data (kt)
Source: Global Critical Minerals Outlook 2025, IEA

## Cobalt: a strategically scarce metal in the electrification transition

### 1. Global cobalt demand structure and regional dynamics

According to the International Energy Agency's "Global Critical Minerals Outlook 2025", global cobalt demand is projected to grow steadily over the medium to long term, with electric vehicle batteries becoming the primary driver and China maintaining a dominant position on the demand side.

#### POINT 01 Total demand and sectoral shifts

In aggregate terms, global cobalt demand increases from approximately 150 kt in 2020 to around 220 kt in 2024, reaching approximately 310 kt in 2030 and 330 kt in 2040, and approaching 390 kt by 2050, reflecting a sustained upward trend.

From a sectoral perspective, the battery segment continues to strengthen its leading role:

- Cobalt demand for electric vehicle batteries rises from approximately 25 kt in 2020 to around 70 kt in 2024, reaching approximately 140 kt in 2030, around 135 kt in 2040 and increasing further to about 170 kt by 2050.
- Other battery applications grow from approximately 70 kt in 2020 to around 130 kt by 2050, maintaining steady expansion.
- Demand from other uses remains relatively stable, reaching approximately 80 kt by 2050, with its overall share gradually declining.

After 2030, cobalt demand from electric vehicle batteries surpasses traditional applications such as consumer electronics, marking a structural shift in cobalt consumption from electronics-led demand to new energy vehicle-driven demand.

Under more ambitious decarbonization pathways, demand increases further:

- Under the APS scenario, total demand reaches approximately 330 kt in 2030 and around 450 kt by 2050.
- Under the NZE scenario, demand rises to approximately 400 kt in 2030 and approaches 500 kt by 2050, reflecting stronger resource intensity under deeper decarbonization pathways.

#### POINT 02 Regional distribution and China's leading role

Regionally, global cobalt consumption remains highly concentrated, with China retaining a dominant position:

- China's demand increases from approximately 100 kt in 2020 to around 150 kt in 2024, reaching approximately 200 kt in 2030, around 195 kt in 2040 and exceeding 210 kt by 2050.
- Other Asian economies (excluding China) grow from approximately 30 kt in 2020 to around 110 kt by 2050.
- Demand in Europe and North America remains comparatively modest, stabilizing at approximately 30–40 kt each by 2050.
- Other regions account for a relatively small and stable share of global demand.

In terms of concentration, the largest consuming country accounts for approximately 55%–65% of global cobalt demand throughout the projection period, indicating a high degree of reliance on the Chinese market.



#### POINT 03 Structural implications for the industry

Taken together, global cobalt demand exhibits two defining characteristics:

- Electric vehicle batteries represent the key determinant of long-term demand growth, accelerating cobalt's transition from a material primarily used in consumer electronics to a critical input for new energy technologies.
- China's integrated strengths in battery manufacturing and materials processing reinforce its leading position in the global cobalt consumption system.

Under more ambitious transition pathways such as APS and NZE, demand growth becomes more pronounced, placing greater emphasis on upstream resource security and midstream processing capacity.

Overall, the global cobalt market reflects a long-term structure characterized by "new energy-driven growth and demand". This dynamic creates sustained development opportunities for companies with integrated resource capabilities, battery material expertise and resilient supply chain positioning.

**Demand:** China continues to dominate cobalt demand as EV battery demand surpassesconsumer electronics by the late 2020s

Global cobalt demand outlook by sector and region

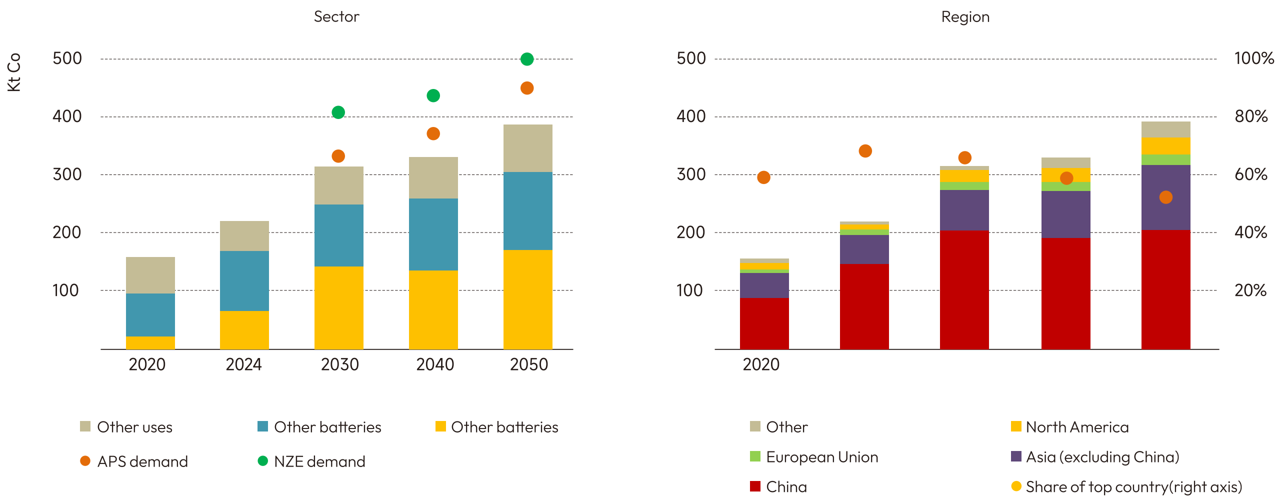



Figure 1: Cobalt demand by sector and region, selected years
Source: Global Critical Minerals Outlook 2025, IEA

## 2. Structural shifts in global cobalt supply and regional dynamics

Under the baseline outlook referenced in the International Energy Agency's Global Critical Minerals Outlook 2025, the global cobalt value chain is undergoing structural adjustment across both upstream mining and midstream refining. While the Democratic Republic of the Congo remains the leading supplier, its relative dominance is expected to moderate over time as emerging producers, particularly Indonesia, expand their role.

### POINT 01 Mining: declining share of the Democratic Republic of the Congo and rapid growth in Indonesia

At the mining stage, global cobalt production increases from approximately 130 kt in 2015 to around 270 kt in 2024, reaching approximately 320 kt in 2030. Thereafter, output is projected to decline to about 260 kt in 2035 and further to around 210 kt in 2040, reflecting a peak followed by gradual contraction under current project assumptions.

**Within this total:**

- The Democratic Republic of the Congo remains the largest producer. Output increases from approximately 70 kt in 2015 to around 180 kt in 2024, reaching approximately 200 kt in 2030 before declining to around 110 kt by 2040. Its share of global mine supply decreases from over 55% in 2015 to approximately 50% by 2040.
- Indonesia's production rises from less than 10 kt in 2015 to around 40 kt in 2024, reaching approximately 60 kt in 2030 and remaining close to that level by 2040, becoming the most significant source of incremental supply growth.
- Other traditional producers, including Russia, Australia and Canada, maintain relatively stable output without establishing new dominant positions.

Overall, the mining segment shows a gradual shift from single-country dominance towards a more diversified, though still concentrated, structure.

### POINT 02 Refining: continued dominance of China

In the refining segment, global refined cobalt production increases from approximately 120 kt in 2015 to around 250 kt in 2024, exceeding 320 kt by 2030 and stabilising at around 330 kt by 2035–2040.

Concentration at the refining stage is even more pronounced:

- China maintains a leading position throughout the period, with refined output increasing from approximately 70 kt in 2015 to around 250 kt by 2030 and remaining above 250 kt through 2040.
- China's share of global refined cobalt production remains in the range of approximately 70%–75%.
- Finland, Japan and the Republic of Korea retain certain refining capacities, but their combined share remains comparatively limited.
- The top three refining countries together account for more than 80% of global output, indicating a high degree of concentration in Asia.

### POINT 03 Implications of supply structure adjustment

Taken together, the global cobalt supply system is evolving from a structure dominated primarily by the Democratic Republic of the Congo towards a dual-core mining structure involving the Democratic Republic of the Congo and Indonesia, while midstream processing capacity becomes increasingly concentrated in China.

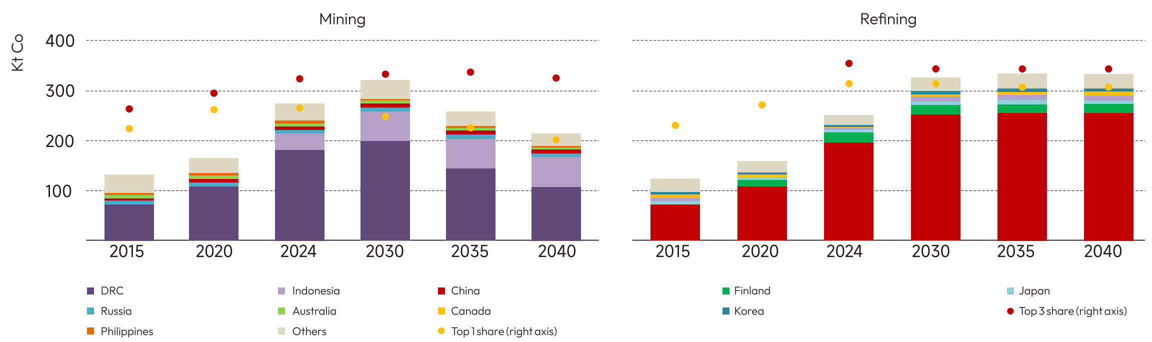
Indonesia's expansion of nickel–cobalt co-production contributes to greater diversification of upstream supply. At the same time, China's strengths in cathode materials and battery manufacturing reinforce its leading position in global cobalt refining.

By 2040, the Democratic Republic of the Congo's share of global supply declines to approximately 50%. While this may partially ease concentration-related geopolitical and compliance risks, the overall supply chain remains highly concentrated. Secure upstream resource access and stable midstream processing capacity continue to represent core competitive factors in the cobalt industry.

Overall, the global cobalt supply landscape is being reshaped. Companies with integrated resource development capabilities, refining advantages and international operational footprints are likely to be better positioned in the evolving new energy materials market.

**Supply:** Rising mined cobalt production in Indonesia diminishes the DRC's dominant marketposition, bringing its market share down to 50% by 2040

Cobalt production from operating and announced projects in the base case








## 3. Cobalt supply–demand balance

Under the STEPS pathway assessed in the International Energy Agency's Global Critical Minerals Outlook 2025, global cobalt demand continues to increase through 2030 before entering a more moderate growth phase and gradually stabilizing thereafter.

In aggregate terms, total demand rises from 187 kt in 2021 to 221 kt in 2024, reaching 314 kt in 2030. By 2040, demand increases only marginally to approximately 330 kt, indicating a clear deceleration in growth beyond 2030.

From a structural perspective, clean technology applications remain the principal growth driver, although medium- to long-term expansion moderates:

- Cobalt demand for clean technologies increases from 37 kt in 2021 to 71 kt in 2024 and reaches 148 kt in 2030, before easing to 136 kt by 2040.
- Its share of total demand rises from around 20% in 2021 to approximately 47% in 2030, followed by a modest decline.
- Demand from other traditional uses increases steadily from 150 kt in 2021 to 194 kt by 2040.

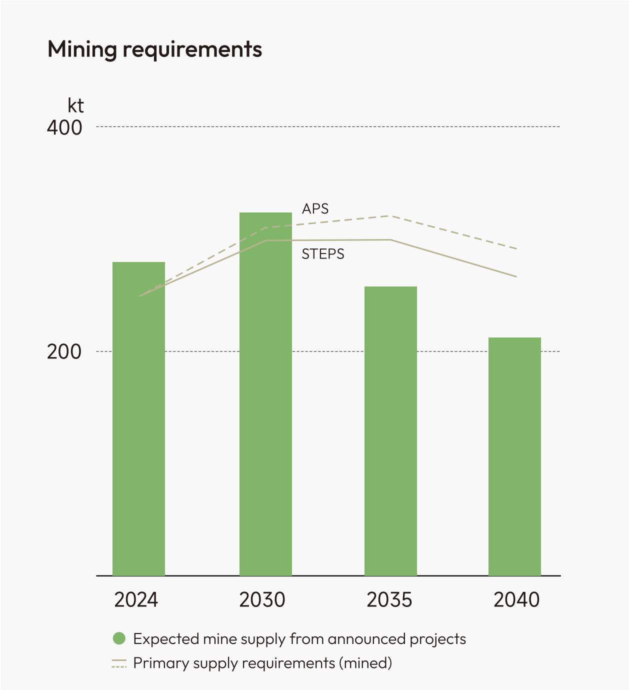
On the supply side, recycled material becomes increasingly significant:

- Recycled supply grows from 15 kt in 2021 to 26 kt in 2024, reaches approximately 39 kt in 2030 and increases further to 82 kt by 2040.
- The share of recycled cobalt rises from below 10% in 2021 to approximately 25% by 2040.
- Primary supply increases from 182 kt in 2021 to around 276 kt in 2030, before declining to approximately 247 kt in 2040.

Based on announced mine projects, total mining capacity peaks at around 320 kt by 2030 before declining to approximately 210 kt by 2040. Under the STEPS scenario, primary resource demand broadly aligns with supply capacity up to 2030. Beyond 2030, as demand growth slows and recycled supply expands, reliance on new mining projects diminishes.

Overall, under the STEPS scenario, the global cobalt market exhibits a pattern of mid-term peak and subsequent stabilization. Improvements in battery chemistry and higher energy density reduce cobalt intensity per unit of output, while the gradual expansion of recycling systems increases substitution for primary material.

In this context, companies with low-cost resource bases, integrated development of associated metals and established recycling capabilities are likely to maintain competitive advantages during the structural adjustment phase of the cobalt value chain.




Cobalt has high recycling potential and is one of the key metals supporting the circular economy.

Table: Primary and recycled cobalt supply and demand under the STEPS scenario

| STEPS scenario | 2021 | 2024 | 2030 | 2040 |
|---|---|---|---|---|
| Clean technology demand (kt) | 37 | 71 | 148 | 136 |
| Other demand (kt) | 150 | 150 | 166 | 194 |
| Total demand (kt) | 187 | 221 | 314 | 330 |
| Recycled supply (kt) | 15 | 26 | 39 | 82 |
| Primary supply (kt) | 182 | 250 | 276 | 247 |

Source: Global Critical Minerals Outlook 2025, IEA

# 03. Strategic alignment with climate transition opportunities


As the global economy accelerates deep decarbonization, energy systems are undergoing structural transformation. Energy supply is shifting from fossil fuels towards renewable sources, while resource use is evolving from linear consumption to more circular models. Critical minerals form the material foundation of this transition. Copper, nickel and cobalt are widely used in power infrastructure, electric vehicles and energy storage systems, and directly influence the pace and security of global electrification.

For our company, the energy transition reshapes not only demand patterns but also the strategic positioning of our asset portfolio. With operations across the Democratic Republic of the Congo, Indonesia and China, we have established an integrated multi-metal platform spanning mining, smelting and materials processing. These core assets are positioned at key nodes of the new energy value chain, providing a foundation for participation in long-term transition dynamics.

## POINT 01 Copper: supporting electrification

Under net-zero pathways, copper remains an essential input for grid expansion, renewable power generation and end-use electrification. Our resource base in the Democratic Republic of the Congo, combined with refining capacity in China, provides supply stability to meet growing electrification demand. As a key midstream hub, our refining operations in China are progressively improving their emissions profile through renewable electricity procurement and energy efficiency enhancement.

Strategically, our copper business is gradually strengthening its alignment with low-carbon applications, serving not only traditional industrial demand but increasingly supporting renewable energy systems and power infrastructure development.

## POINT 02 Nickel: enabling the battery transition

With the acceleration of electrification, high-nickel cathode chemistries have become an important technology pathway for power batteries. Our laterite nickel resources and associated hydrometallurgical processing capacity in Indonesia position us within the global nickel supply system. These investments are aligned both with global decarbonization trends and with Indonesia's policy objective of promoting downstream processing of mineral resources.

In domestic nickel processing, we are implementing waste heat recovery, off-gas utilization and renewable power substitution to reduce energy intensity and lower the carbon footprint of our products, supporting long-term competitiveness in battery materials supply chains.

## POINT 03 Cobalt: ensuring battery stability and performance

Cobalt plays a critical role in improving safety and cycle stability in lithium-ion batteries and remains difficult to fully substitute in current battery chemistries. At the same time, global cobalt supply is highly concentrated, raising considerations around supply security. Through long-term positioning in the cobalt belt of the Democratic Republic of the Congo, we have developed integrated resource access and processing capabilities, strengthening raw material availability and supply continuity.

## POINT 04 System integration: from a mining company to a transition-aligned materials platform

Our multi-metal structure reflects structural alignment with the energy transition:

- **Geographically**

  the presence of operations in both the Democratic Republic of the Congo and Indonesia provides diversification across resource regions, helping to mitigate concentration-related supply and operational risks.

- **Technically**

  hydrometallurgical and electrorefining processes enable synergies across different metals.

- **Along the value chain**

  copper, nickel and cobalt collectively serve electrification, energy storage and renewable energy deployment.

Building on this integrated platform, we are strengthening our role within the transition value chain while maintaining core mining capabilities. Through continuous process optimization, renewable energy substitution and carbon management, we aim to enhance the sustainability profile of our products and reinforce their position within green finance and low-carbon supply chain frameworks, supporting long-term business resilience and growth.

## ANNEX I

| Shanghai Stock Exchange Self-Regulatory Guidelines No.4 Disclosure Requirements | China Sustainability Disclosure Standard No.1 — Climate (Trial) Disclosure Requirements | IFRS S2 Disclosure Requirements | TCFD Disclosure Requirements | Chapter |
|---|---|---|---|---|
| Climate-related governance bodies | Climate-related governance bodies | Governance | Describe the board's oversight of climate-related risks and opportunities. | Our Climate Governance |
| Professional skills and competencies of climate-related governance bodies (personnel) | Professional skills and competencies of climate-related governance bodies (personnel) | | Describe management's role in assessing and managing climate-related risks and opportunities. | Our Climate Governance |
| Mechanisms for climate-related governance bodies (personnel) to obtain information | Mechanisms for climate-related governance bodies (personnel) to obtain information | | | Our Climate Governance |
| Oversight activities of climate-related governance bodies (personnel) | Oversight activities of climate-related governance bodies (personnel) | | | Our Climate Governance |
| Integration of climate-related factors into decision-making by climate-related governance bodies | Integration of climate-related factors into decision-making by climate-related governance bodies | | | Our Climate Governance |
| Significant climate-related impacts | Significant climate-related impacts | | | Climate physical risks and response measures<br>Managing climate transition risks<br>Assets and Portfolio |
| Climate-related risks and opportunities | Climate-related risks and opportunities | Climate-related risks and opportunities | Describe the climate-related risks and opportunities the organization has identified over the short, medium, and long term. | Climate physical risks and response measures<br>Managing climate transition risks<br>Assets and Portfolio |
| Impacts of climate-related risks and opportunities on the business model and value chain (encouraged) | Impacts of climate-related risks and opportunities on the business model and value chain (encouraged) | Business model and value chain | Describe the impact of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning. | Climate physical risks and response measures<br>Managing climate transition risks<br>Assets and Portfolio |
| Impacts of climate-related impacts, risks, and opportunities on the reporting entity's strategy and decision-making | Impacts of climate-related impacts, risks, and opportunities on the reporting entity's strategy and decision-making | Strategy and decision-making | | Climate physical risks and response measures<br>Managing climate transition risks<br>Assets and Portfolio |
| Climate-related transition plan | Climate-related transition plan | | | Climate physical risks and response measures<br>Managing climate transition risks<br>Assets and Portfolio |

| Shanghai Stock Exchange Self-Regulatory Guidelines No.4 Disclosure Requirements | China Sustainability Disclosure Standard No.1 — Climate (Trial) Disclosure Requirements | IFRS S2 Disclosure Requirements | TCFD Disclosure Requirements | Chapter |
|---|---|---|---|---|
| Current-period climate-related financial impacts | Current-period climate-related financial impacts | Financial position, financial performance and cash flows | | Climate physical risks and response measures<br>Managing climate transition risks<br>Assets and Portfolio |
| Expected climate-related financial impacts (encouraged) | Expected climate-related financial impacts (encouraged) | | | Climate physical risks and response measures<br>Managing climate transition risks<br>Assets and Portfolio |
| Climate resilience assessment | Climate resilience assessment | Climate resilience | Describe the resilience of the organization's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario. | Climate physical risks and response measures<br>Managing climate transition risks<br>Assets and Portfolio |
| Processes for managing climate-related impacts, risks and opportunities | Processes for managing climate-related impacts, risks and opportunities | Climate-related metrics | Describe the organization's processes for identifying and assessing climate-related risks.<br>Describe the organization's processes for managing climate-related risks.<br>Describe how processes for identifying, assessing, and managing climate-related risks are integrated into the organization's overall risk management. | Climate physical risks and response measures<br>Managing climate transition risks<br>Assets and Portfolio |
| Climate-related targets | Climate-related targets | Climate-related targets | Disclose the metrics used by the organization to assess climate-related risks and opportunities in line with its strategy and risk management process. | Operational greenhouse gas emissions (Scope 1 and Scope 2)<br>Value chain carbon emissions (scope 3) |
| Progress in achieving climate-related targets | Progress in achieving climate-related targets | | | Operational greenhouse gas emissions (Scope 1 and Scope 2)<br>Value chain carbon emissions (scope 3) |
| Greenhouse gas emissions | Greenhouse gas emissions | | Disclose Scope 1, Scope 2 and, if appropriate, Scope 3 greenhouse gas (GHG) emissions and the related risks. | Operational greenhouse gas emissions (Scope 1 and Scope 2)<br>Value chain carbon emissions (scope 3) |
| Greenhouse gas emission reduction practices | Greenhouse gas emission reduction practices | | Describe the targets used by the organization to manage climate-related risks and opportunities and performance against targets. | Operational greenhouse gas emissions (Scope 1 and Scope 2)<br>Value chain carbon emissions (scope 3) |