



ESG Standards and Practices of Chinese Companies in Critical Minerals Supply Chains

IISD REPORT

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Executive Summary

This study analyzes the management practices of Chinese enterprises in global mineral supply chains from a sustainability perspective. It outlines the Chinese environmental, social, and governance (ESG) management frameworks across both government and voluntary standards in China and examines how these compare to international voluntary sustainability standards (VSSs). Moreover, through stakeholder interviews about the nickel supply chain in Indonesia as a case study, it provides an overview of the main challenges Chinese companies face in implementing ESG practices abroad, including supply chain due diligence. Finally, the study highlights key areas and measures that could contribute to enhancing ESG standards among Chinese mining and processing companies operating overseas.

The Government of China has issued guidelines encouraging compliance with local and international ESG standards by Chinese-controlled mining and processing operations overseas—but only the voluntary standards. Some ESG reporting requirements apply to companies listed on Chinese stock exchanges, but these have limitations in scope—for example, only applying to subsidiaries of listed companies that reach a certain significant profit threshold.

Meanwhile, international market pressures are driving mining and processing companies, including Chinese companies, to strengthen their ESG practices. For instance, regulatory developments in the European Union and other major markets have extended ESG and due diligence requirements across entire supply chains. Downstream manufacturers are increasingly including ESG audits and traceability requirements in supply contracts, while international financiers now demand environmental and social impact assessments (ESIAs) as conditions for investment. These market forces have prompted several Chinese miners and processors to pursue international certifications.

This study analyzes voluntary ESG standards developed by the Government of China and issued by national industry associations that apply to Chinese companies operating mining and processing facilities overseas. It finds that these are generally more aligned with international norms on environmental issues than on social aspects, though gaps persist in both areas. Environmental gaps include aspects of tailings management, water stewardship, and soil protection. On social performance, misalignment is found primarily in community engagement with affected communities, including Indigenous Peoples.

Stakeholder interviews also reveal additional challenges for Chinese mining and processors operating abroad. For instance, the limited international awareness and recognition of Chinese due diligence frameworks results in duplicative audits and increased compliance costs, as many downstream partners still require adherence to internationally recognized standards. Companies also face tensions between transparency requirements and data security obligations under Chinese law. Finally, ESG risks are often transferred upstream along the supply chain.



In this context, the study proposes the following policy recommendations to improve the sustainability management of overseas Chinese mining and processing companies:

1. **Advance the alignment of Chinese mining sector ESG standards with leading international benchmarks and deepen multistakeholder coordination.** The Chinese government could provide support to accelerate a systematic convergence with global standards while strengthening engagement with host governments, international organizations, civil society, and downstream companies to improve consistency and credibility across the mineral value chain.
2. **Introduce financial incentive schemes linked to verifiable ESG performance on a global scale.** The Chinese government could develop performance-based incentives—such as preferential credit terms, tax benefits, insurance advantages, or access to green finance instruments—for enterprises that demonstrate robust ESG management, third-party audited due diligence, or certification under internationally recognized responsible mining and sourcing standards, both within China and abroad.
3. **Establish structured bilateral technical cooperation mechanisms on ESG in mineral supply chains.** The Chinese government could set up formalized bilateral cooperation platforms with key mineral-producing countries to exchange regulatory information, align due diligence expectations, and build shared verification and monitoring capacities. Such mechanisms should include joint working groups, technical standards dialogues, and collaborative pilot projects on responsible mining practices.
4. **Support the establishment of ESG research, training, and capacity-building centres in strategic mineral-rich countries.** The Chinese government could support the creation of dedicated centres that provide technical and legal training, risk-assessment tools, and the dissemination of best practices for Chinese enterprises and local partners. These centres would enhance on-the-ground capabilities, support local institutional development, and help reduce ESG-related project risks.
5. **Clarify Chinese data security regulations for audit programs in mineral supply chain due diligence and ESG management.** The Chinese government could work with regulators in both upstream and downstream economies to develop guidelines for better interoperability between international audit and supply chain transparency requirements on the one hand and Chinese data security regulations on the other. Reducing uncertainty for reporting companies could also increase trust in China-based audits on a global scale.



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Abbreviations and Acronyms

AMDAL	Analisis Mengenai Dampak Lingkungan (Indonesian framework for environmental planning, management, supervision, and impact assessment)
ASM	artisanal and small-scale mining
CCCMC	China Chamber of Commerce of Metals, Minerals & Chemicals Importers & Exporters
CNIA	China Non-Ferrous Metals Industry Association
CSRC	China Securities Regulatory Commission
DRC	Democratic Republic of the Congo
EIA	environmental impact assessment
ESG	environmental, social, and governance
ESIA	environmental and social impact assessment
EU	European Union
FPIC	Free, Prior, and Informed Consent
GDDM	Guidelines for Responsible Mineral Supply Chain Due Diligence in China
GHG	greenhouse gas
GIDM	Guidelines for ESG Information Disclosure of Non-Ferrous Metal Enterprises
GSRM	Guidance for Social Responsibility in Overseas Mining Investment
HKEX	Hong Kong Exchanges and Clearing Limited
HPAL	high-pressure acid leaching
IEA	International Energy Agency
IGF	Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development
ILO	International Labour Organization
IRMA	Initiative for Responsible Mining Assurance
ISO	International Organization for Standardization
LME	London Metal Exchange
MEE	Ministry of Ecology and Environment, People's Republic of China
MIIT	Ministry of Industry and Information Technology, People's Republic of China
MOFCOM	Ministry of Commerce
MHP	mixed hydroxide precipitate



MSP	mixed sulfide precipitation
NDRC	National Development and Reform Commission, People's Republic of China
NGO	non-governmental organization
OECD	Organisation for Economic Co-operation and Development
OHS	Occupational Health and Safety
OMS	operations, maintenance, and surveillance
PROPER	Program Penilaian Peringkat Kinerja Perusahaan dalam Pengelolaan Lingkungan Hidup (Company Environmental Performance Rating Program)
PSN	National Strategic Projects
RMI	Responsible Minerals Initiative
RRA	Risk Readiness Assessment Criteria
SASAC	State-owned Assets Supervision and Administration Commission of the State Council
SISPEK	Continuous Industrial Emissions Information System
SOE	state-owned enterprise
SSI	sustainability standards initiative
TFM	Tenke Fungurume Mining S.A
UNEP	United Nations Environment Programme
VSI	voluntary sustainability initiative
VSS	voluntary sustainability standards



1.0 Introduction: China's pivotal role for more sustainable mineral supply chains

Critical minerals¹ are essential components of the technologies driving the energy and digital transitions. The International Energy Agency (IEA) projects that to reach the goals of the Paris Agreement, the global demand for minerals critical to renewable energy production facilities and associated technologies may quadruple by 2040 compared to 2020 (IEA, 2022). This growth in demand, which is already boosting new mining and mineral processing projects across the globe, will also significantly increase the sector's environmental and social footprint, particularly in resource-rich countries seeking more added value to raw material extraction by attracting smelting and refining industries.² Thus, there is a commensurate need to strengthen sustainable management practices and promote more responsible corporate behaviour across critical mineral supply chains. At the international level, numerous environmental, social, and governance (ESG) standards applicable to mineral supply chains aim to mitigate risks and negative impacts associated with scaling up mineral production and global supply chains (United Nations Environment Programme [UNEP] & Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development [IGF], 2025).

China maintains a dominant position across critical mineral processing value chains by both geography and ownership, as well as in the manufacturing of key technologies for the energy and digital transition. China is the dominant refiner for 19 of the 20 critical minerals tracked by the IEA and holds an average market share of around 70% (IEA, 2025)—the exception being nickel, for which Indonesia is the world's leading refiner, largely thanks to Chinese investment and technology. Calculated by ownership, Chinese companies accounted for 40% of global copper production and 65% of nickel production, compared with nearly 50% and 30%, respectively, by geographic location (IEA, 2025b).³

Therefore, by strengthening and upholding ESG performance standards, Chinese companies can make significant positive contributions to the overall sustainability of the minerals sector globally.

This study unfolds across eight sections. After outlining objectives, scope, and methodology (Section 1), it provides a snapshot of global trends in ESG management across international mineral supply chains (Section 2). Building on this foundation, Section 3 examines China's domestic ESG framework, covering relevant laws, policies, regulations, and standards. Section

¹ Definitions of what constitutes a “critical” mineral vary by geography, time, and viewpoint. Many countries and research bodies have developed their own methodologies for (re)assessing mineral criticality over the years. The IGF (2024) has further provided guidance on relevant considerations for such criticality assessments. While the outcomes necessarily differ between different countries, depending on their own mineral endowments, economic structure, and positions in supply chains, the two commodities discussed in depth in this study—copper and nickel—are consistently listed as critical minerals, particularly due to their relevance for energy transition and digital technologies.

² Mineral processing encompasses both **smelting** (the transformation of mined ores and concentrates into crude or intermediate metals) and **refining** (the purification of those metals into high purity chemical or metallic forms).

³ Ownership is based on the location of company headquarters. For projects run by multiple companies, production is assigned to the company with the largest share.



4 focuses on the voluntary ESG guidance for Chinese companies operating overseas. Section 5 moves to a comparative assessment, contrasting key features of selected Chinese ESG standards with those of a selected international standard as a benchmark. Section 6 focuses on the ground level, presenting a case study of Chinese nickel processors operating in Indonesia. Section 7 synthesizes these insights, providing a cross-cutting analysis of ESG management practices among Chinese mineral sector companies abroad. Finally, Section 8 outlines policy recommendations to help strengthen ESG performance in global mineral supply chains.

1.1 Study Objectives

The International Institute for Sustainable Development conducted this study⁴ to analyze the ESG management practices of Chinese companies in mineral supply chains, draw insights on progress and challenges, and provide policy recommendations to improve management practices.

The main objectives of this study are to identify

- existing ESG provisions in Chinese regulations and voluntary standards applicable to mineral processing (beneficiation, smelting, and refining), with a particular focus on those that apply to Chinese companies operating overseas;
- areas of alignment or divergence between international and Chinese ESG standards applicable to nickel processing outside of China;
- how Chinese nickel processing companies operating overseas implement ESG requirements and the key implementation challenges they face; and
- key areas and measures that could contribute to enhancing ESG standards among Chinese mining and mineral processing companies operating overseas.

1.2 Scope of Study and Definitions

The study analyzes and compares the ESG landscape applicable to Chinese companies⁵ operating in mineral value chains in China and abroad, using nickel processing in Indonesia as a case study. Nickel was selected as a focus material for the case study because Chinese companies process it both within China and abroad, enabling comparison between domestic processing practices and those of Chinese companies operating overseas. While most of the Chinese ESG standards relevant for the present analyses are not limited to one specific material or to one segment of supply chains, the Indonesia case study selected for in-depth analysis focuses on nickel *processing*—defined here as the set of activities that convert mined nickel ore into saleable intermediates or high purity nickel products (IGF & African Development Bank, 2025), reflecting Indonesia’s emerging role as a global leader in domestic

⁴ The International Institute for Sustainable Development collaborated with Reach International in the research and drafting of this report.

⁵ Due to the complex transnational landscape of corporate ownership in the mining and minerals space, it is not always obvious what constitutes a “Chinese company.” Unless specified otherwise, this study refers to companies whose headquarters and majority-owned subsidiaries are in China as “Chinese companies.”



nickel processing and “downstreaming” policies.⁶ Accordingly, when this report refers to “processing,” it encompasses beneficiation/concentration where relevant, smelting and/or leaching, and refining.

While there is no universally accepted definition of ESG, this study borrows from the Cornell Law School, which has a widely cited definition of “a broad framework for addressing environmental, social and governance issues in the context of business and investment” (Legal Information Institute, n.d.). Importantly, this definition emphasizes that ESG provides a framework to measure, assess, and manage a company’s impact and practices across ESG dimensions, and to inform investment and business decisions aligned with sustainability and ethics (e.g., human rights).

ESG is thus understood as a sustainability-related risks and opportunities management framework for organizations, which should include strategy and governance structures, policies and standards, data collection systems, performance measurement and improvement, materiality assessments, risk management processes, due diligence, reporting and disclosure, and comprehensive stakeholder engagement. Analysis of ESG frameworks in the study covers different components mentioned above, but focuses mainly on due diligence—reporting and disclosure standards that can range from purely voluntary guidelines to more stringent norms integrated into international market access standards or public regulation, as explained in previous reports on sustainability standards and initiatives (SSIs) (UNEP & IGF, 2025).

1.3 Methodology

Research for this study combined document analysis of policies, guidelines, and company reports published in Chinese and English with stakeholder interviews conducted at different sectoral events in Europe, China, and Indonesia, as well as online between April and November 2025. Stakeholders included representatives from Chinese mining companies and smelters, government agencies, and industry associations, as well as Indonesian and international non-governmental organizations (NGOs) and think tanks.

Desk research was conducted to identify and map out both Chinese and international ESG frameworks relevant to the nickel supply chain, as well as the key Chinese companies operating in Indonesia. A literature review was also undertaken to provide an overview of prominent ESG issues raised in relation to Chinese mineral processors operating in Indonesia.

Stakeholder interviews provided more in-depth information and insights into the ESG performance and practices of Chinese companies. Eleven mineral operators were selected for

⁶ In many critical minerals value chain frameworks, mining and extraction are treated as “upstream,” while “midstream” covers mineral concentration and metallurgical/chemical processing (including smelting and refining). “Downstream” refers to component and end product manufacturing (United Nations Economic Commission for Europe, 2026). Following extraction, nickel ores are processed using pyrometallurgical smelting for sulfide ores or hydrometallurgical routes, such as high pressure acid leaching (HPAL), for laterite ores. These processes produce intermediate products including ferronickel, nickel matte, and mixed hydroxide precipitate (MHP). The intermediates are then refined into either Class 1 nickel, a high purity product used in batteries and advanced alloys, or Class 2 nickel, a lower purity product primarily used in stainless steel production, typically via ferronickel or nickel pig iron routes (IGF & African Development Bank, 2025).



interviews based on their relevance to the mineral processing business and readiness to share their experiences. One Indonesian government agency and seven representatives from industry associations or initiatives, NGOs, and think tanks were interviewed for complementary insights. A detailed anonymized list of interviews is available in Appendix A.



2.0 Trends in ESG Management in Transnational Mineral Supply Chains

This section provides a brief overview of key ESG drivers and trends in transnational mineral supply chains, which serves as a crucial background for understanding developments in Chinese ESG policy and the industry.

Government regulation and market forces are both necessary key drivers for improved ESG management in the global critical minerals supply chains (UNEP & IGF, 2025). These stem from national and international agreements and commitments to address global environmental crises (e.g., climate change, biodiversity loss, and pollution), uphold human rights, and promote sustainable development. Since critical minerals play an essential role in the transition toward low-emission economies, their responsible sourcing has come under greater public scrutiny. Requirements for due diligence management audits in the international minerals supply chain have gradually expanded from conflict minerals (i.e., tin, tantalum, tungsten, and gold, often abbreviated as 3TG) to base metals such as cobalt, copper, nickel, and lithium. Today, more companies and investors are recognizing that sustainability is material to their business interests and are embracing ESG to manage their own sustainability risks.

Government regulations in key jurisdictions have also shifted global market requirements, driving the adoption of ESG practices and compliance for Chinese firms operating overseas. Consumer markets, most notably the European Union (EU), have begun to strengthen the promotion and implementation of ESG requirements worldwide through legislation and regulations—such as the EU Batteries Regulation and the Corporate Sustainability Due Diligence Directive—that emphasize transparency and traceability across entire supply chains, setting the tone of market expectations across industries and commodities. Although European Commission proposals under the guise of regulatory simplification launched in February 2025 are expected to ease some requirements,⁷ transparency and traceability in supply chains remain the focus of relevant regulations. As a result, requirements for mineral supply chain enterprises have gradually expanded from only requiring due diligence reporting on chokepoints (i.e., refineries and smelters) to comprehensive ESG management audits across the entire supply chain, from upstream to downstream.

Alongside such regulatory developments, market actors—notably large-scale investors and downstream buyers—are increasingly resorting to voluntary sustainability standards (VSSs) or voluntary sustainability initiatives (VSIs) (IGF, 2018) to mitigate their own social and environmental risks. VSSs are formulated and governed by non-governmental actors and multistakeholder groups, focusing on sustainable development in areas such as health and safety, environmental impact, and social responsibility. They are concerned with managing the environmental and social impacts of products, services, and production processes in value

⁷ The 2025 Omnibus package extends the implementation timeline of sustainability-related policies and regulations, expands the scope of exemptions, and reduces the frequency of assessments or reports.



chains. VSS schemes relevant to mineral supply chains have grown considerably over the past 3 decades (UNEP & IGF, 2025).

Global manufacturers routinely include ESG requirements in purchase contracts, helping to raise ESG performance standards in global mineral supply chains. Downstream companies also face increasing pressure from NGOs and their own investors (e.g., BlackRock, State Street Corporation, etc.). Research shows that, globally, investors incorporate sustainability factors into decision making. They report that audited or assured disclosures (e.g., through VSIs) are trusted information sources for their decision making about supply chain sourcing (Deloitte, 2024). Major European and American downstream metal buyers, such as Volkswagen, Mercedes-Benz, Tesla, and Ford, include requirements for suppliers to conduct ESG audits in their order contracts (Appendix A, interview 23). Hence, the adoption and implementation of ESG standards are increasingly binding in nature for suppliers, including Chinese companies, even in the absence of public regulation.

Within ESG management frameworks, due diligence is a salient risk management sub-component that has gained importance in international supply chains. For example, the London Metal Exchange's (LME's) 2019 Responsible Sourcing Policy requires all LME-registered brands (dealing in copper, aluminum, lead, zinc, tin, nickel, and cobalt) to establish a management system aligned with the Organisation for Economic Co-operation and Development (OECD) Due Diligence Guidelines for Mineral Supply Chains in Conflict-Affected and High-Risk Areas. This system must identify supply chain risks, conduct due diligence management assessments, and be subject to third-party audits. Companies are required to publicly disclose the assessment summary report within a deadline; failure to do so may result in suspension or delisting.

Furthermore, compliance with ESG standards, as defined by the International Finance Corporation's Performance Standards on Environmental and Social Sustainability (2012), is an increasingly common condition for accessing not only equity investments from international development banks but also commercial financing in international markets (Mendonça Severiano et al., 2024). And since ESIA have become statutory prerequisites for mining in many jurisdictions, international financiers have integrated standardized ESIA procedures regardless of jurisdiction as a precondition for investing in new mines or facilities.

Recent analysis highlights that the rapidly expanding landscape of sustainability standards, initiatives, and reporting frameworks has become increasingly complex and fragmented, creating significant challenges for both suppliers and downstream actors (UNEP & IGF, 2025). While sector-specific SSIs have driven important improvements, limited interoperability between SSIs—and between private standards and public policy frameworks—risks reducing their effectiveness and raises compliance costs. UNEP and IGF (2025) point to growing efforts at harmonization, including alignment with OECD due diligence guidance, convergence around common ESG metrics, and the development of shared audit and assurance approaches. At the same time, new initiatives and platforms continue to enter the field, often with overlapping scope, increasing the risk of further standards proliferation. Without stronger coordination and clearer interfaces between private standards and public regulation, this fragmentation risks diluting incentives, reducing transparency, and weakening the overall credibility of ESG-based governance in mineral supply chains.



3.0 China's ESG Framework for Mineral Chains

3.1 Development of China's Domestic ESG Framework

China's ESG requirement system has evolved within the broader framework of the country's national sustainable development strategy.⁸ Through a combination of policy, law, regulation, and guidance, the state sets the overall direction for mineral processors in China to align business practices with national development goals such as “ecological civilization”⁹ and green transformation. Companies are expected to integrate social responsibility and ESG-related requirements into their strategies, governance structures, and daily operations. Thus, China's ESG framework has been primarily driven by government policy and regulatory guidance, as well as informal political expectations toward corporate entities, with industry standards and market-based mechanisms playing a complementary, supporting role (Chen, 2024; Shen et al., 2023; Tan-Mullins, 2014).

In 2006, China's Company Law incorporated the concept of “social responsibility” into corporate statutory obligations for the first time. Following a comprehensive revision adopted in 2024, the Company Law now explicitly requires companies to “fully consider the interests of stakeholders such as the company's employees and consumers, as well as social public interests including ecological and environmental protection” when fulfilling their social responsibilities. The revised law also encourages companies to publish social responsibility reports, thereby reinforcing expectations around transparency and non-financial disclosure (National People's Congress Standing Committee, 2006, 2023).

Chinese regulatory authorities have issued a growing number of policy documents incorporating ESG-related elements, typically in the form of guiding opinions, opinions, work guidelines, and implementation plans. These instruments function mainly as soft law tools, aiming to steer corporate behaviour and standardize ESG disclosure and performance practices rather than to impose directly binding obligations (Lang & Zhou, 2025). Through these documents, regulators seek to improve consistency, transparency, and comparability in ESG-related information while encouraging enterprises to integrate sustainability considerations into their operations and overseas investments (Central Committee of the Communist Party of China & State Council of the People's Republic of China, 2024; Ministry of Industry and Information Technology [MIIT], 2025a, 2025b).

⁸ Research for this study took place during 2025 and concluded in January 2026. It does not cover the most recent changes in the evolving Chinese ESG regulatory framework, including the adoption of two relevant new laws that entered into force in April 2026: The Regulations on Industrial and Supply Chain Security (国务院关于产业链供应链安全的规定); and the Regulations on Countering Foreign Improper Extraterritorial Jurisdiction (中华人民共和国反外国不当域外管辖条例).

⁹ The concept of “ecological civilization” has functioned as a top level governance principle in Chinese policy-making since it was formally endorsed at the 18th Communist Party of China Congress (2012) and written into the Party Constitution. It provides a long-term vision for Chinese environmental policy geared toward building what the leadership describes as a “beautiful China” and links environmental objectives to cadre evaluation, industrial policy, and development planning.



Policy guidance has played a central role in shaping expectations around corporate social responsibility, particularly for state-owned enterprises (SOEs). In 2008, the State-owned Assets Supervision and Administration Commission of the State Council (SASAC) issued the *Guiding Opinions on Central State-Owned Enterprises Fulfilling Social Responsibility* (国资发研究2008]1号) (SASAC, 2008).¹⁰ This document marked the first systematic articulation of social responsibility expectations for central SOEs. SOEs continue to play a key role in China's political economy, not only because they are more directly steered by the state and therefore integrate social policy goals into their corporate calculus, but also because they can act as transmission belts for the Chinese economy at large. Research has found that SOEs are relatively more advanced in terms of ESG disclosure (Shen et al., 2023) and that they exert upward influence over entire supply chains within China (Fang et al., 2025; Qian & Yang, 2023). On the other hand, large SOEs are also powerful actors in the Chinese policy process, and influence over policy decisions may thus influence ESG decision making in their own interest.

In 2016, SASAC further expanded this framework through the *Guiding Opinions on State Owned Enterprises Better Fulfilling Their Social Responsibilities*, extending and systematizing social responsibility requirements across the broader SOE sector (SASAC, 2008, 2016).¹¹ Taken together, these Guiding Opinions reflect a progressive strengthening of SASAC's approach to social responsibility. Initial efforts focused on benchmarking and performance evaluation among central SOEs, followed by the development of more comprehensive management systems and reporting mechanisms and their gradual application to local SOEs and SOE controlled enterprises. While the Guiding Opinions formally apply only to SOEs, SASAC has consistently encouraged other types of enterprises to treat them as reference benchmarks for good practice (SASAC, 2016).

SASAC further issued the *Guiding Opinions on Central SOE Fulfilling Social Responsibility at a High Standard in the New Era* (关于新时代中央企业高标准履行社会责任的指导意见) in 2024, which includes a call for central SOEs to “strengthen ESG practices” including in their overseas operations in the implementation of major projects (SASAC & Administration Commission of the State Council, 2024). This is the first time SASAC provided guidance on the ESG practices of overseas operations of Chinese companies. While corporate ethics and responsibility are emphasized throughout the Guiding Opinions, ESG as a conceptual framing is only connected to the international context and the capital market under Article 12 on International Cooperation.

Substantively, the SASAC Guiding Opinions articulate a broad conception of corporate social responsibility that overlaps with core ESG dimensions, including labour protection and occupational health and safety, environmental management and pollution control, energy efficiency and emissions reduction, corporate compliance and integrity, and the disclosure of non financial information. However, these elements are framed primarily as policy

¹⁰ Central SOEs are a subset of SOEs that are directly owned and supervised by the central government of China, typically through the powerful SASAC.

¹¹ SOE refers to any business entity owned or controlled by the government, either fully or partially. These enterprises can operate at different levels of government, including central (national-level), provincial, or local governments.



expectations and management objectives rather than as legally enforceable standards. Their practical effect therefore depends on incorporation into SOE performance evaluation systems, internal management practices, and supervisory mechanisms operated by SASAC. While the guidance has contributed to shaping norms and reference points for responsible conduct within the SOE sector, its influence on outcomes—particularly in areas such as environmental performance, labour practices, and transparency—remains uneven and contingent on sectoral priorities, enforcement intensity, and alignment with hard regulatory requirements.

Chinese environmental governance standards affecting the mining and mineral processing sectors have been significantly tightened since the revised Environmental Protection Law entered into force on January 1, 2015. The revised Environmental Protection Law marked a structural shift in China’s environmental governance regime by strengthening regulatory powers and enforcement mechanisms (Zhang et al., 2016). It introduced stricter obligations on enterprises, including requirements to comply with pollutant discharge standards, implement environmental impact assessments, disclose environmental information, prevent and control pollution throughout production processes, and assume legal liability for environmental damage. The law also significantly expanded enforcement tools, such as daily accumulating fines for non-compliance, administrative detention in serious cases, and enhanced scope for public interest environmental litigation, thereby increasing compliance pressure on high-impact sectors such as mining and metallurgy (National People’s Congress Standing Committee, 2014; Rooij et al., 2017).

Building on this framework, in 2023 the Central Committee of the Communist Party of China and the State Council of the People’s Republic of China released *Opinions on Comprehensively Promoting the Construction of a Beautiful China* (国务院关于全面推进美丽中国建设的意见). The document sets out medium- and long-term priorities for environmental protection and ecological governance through 2027 and 2035, including policy targets for pollution reduction, ecosystem restoration, and improvements in environmental governance capacity. Importantly, the document calls for the development and application of systematic evaluation and assessment mechanisms covering environmental quality, resource efficiency, and ecological protection performance. While the document is framed as a macro-level policy rather than a binding regulatory instrument, it signals strong high-level political support for further strengthening environmental governance and consolidating the environmental (“E”) dimension of China’s evolving ESG framework, with implications for resource-intensive industries operating domestically and overseas (CPC Central Committee & State Council of the People’s Republic of China, 2023).

In 2024, the central government further issued *Opinions on Accelerating the Comprehensive Green Transformation of Economic and Social Development*, which emphasizes strengthening international policy exchange and practical cooperation on green and ESG-related standards, including in the context of overseas projects. Building on this direction, in 2025, China adopted the *Implementation Plan for Further Promoting Green and Low carbon Standardization in Industry and Information Technology*, which explicitly covers resource-intensive industrial processes, including mineral processing. These initiatives complement the 2022 *Carbon Peak Implementation Plan for the Industrial Sector*, which sets out pathways for low-carbon technology development and energy transition in heavy industry in support of China’s “dual carbon” goals—carbon peaking by 2030 and carbon neutrality by 2060 (Central Committee of the



Communist Party of China & State Council of the People's Republic of China, 2024; MIIT et al., 2022; MIIT, 2025a).

By contrast, none of the above-mentioned policies systematically addresses social topics relevant to international mineral supply chains, such as regulations for engagement with artisanal and small-scale miners or Indigenous Peoples.¹² The 2002 Law of People's Republic of China on Environmental Impact Appraisal, which governs environmental impact assessment (EIA) requirements within China, does not include requirements for social impact assessment either. It only mentions that a project's EIA report should seek opinions from the public and other relevant parties, with no requirements for continuous community engagement or mandatory information disclosure on social impacts.

In 2013, the National Development and Reform Commission (NDRC) issued the Interim Measures for Social Stability Risk Assessment of Major Fixed-Asset Investment Projects, (国家发展改革委重大固定资产投资项目社会稳定风险评估暂行办法) (发改投资 [2012] 2492号) as a social risk-assessment policy that was updated in 2019 but that still retains an interim status (NDRC, 2013). Rather than imposing obligations on companies to conduct comprehensive social impact assessments on human rights or vulnerable groups, these measures provide for social risk assessments only for major "fixed-asset investment projects" subject to "approval or verification by the NDRC, or reported to the State Council for approval or verification" (Art. 2). Assessments focus on potential risks affecting social stability, such as the compliance of the proposed project with current policies, the risk of mass incidents, negative social public opinion, and public acceptance.

3.2 National and Industry Standards: Environment ahead of social

Over the past decade, the Chinese government has placed increasing emphasis on the development of domestic ESG-related standards and on improving their compatibility and mutual recognition with leading international standards (State Council of the People's Republic of China, 2021b; Wei, 2022).¹³ This agenda reflects China's broader standardization strategy, which promotes international benchmarking, participation in global standard setting, and the gradual convergence of technical standards. In 2021, China adopted a National Standardization Development Outline, which explicitly calls for systematic comparison and alignment between Chinese and international standards, followed by a sector-specific action plan for a standards-driven upgrading of the raw materials industry for the 2025–2027 period,

¹² The conceptual category of "Indigenous Peoples" has no direct equivalent in the Chinese legal or political framework. While the term *yuánzhùmín* (原住民) exists linguistically, it is primarily a translated concept used to describe contexts outside of China. Within China, ethnic groups are recognized under the distinct framework of "ethnic minorities" (*shǎoshù mínzú*), which carries different historical and legal connotations than the international definition of Indigenous Peoples. This explains the omission of this topic in all Chinese laws and regulations that apply domestically.

¹³ According to the 2017 Standardization Law of the People's Republic of China, standards in China are categorized into national, sectoral, local, association, and corporate-level standards. National standards are further divided into mandatory and recommended. Both sector and local standards are recommended, though some sector standards may carry mandatory requirements during implementation. Standardization Law clarifies that mandatory standards will be enforced by the state, and the state shall encourage the adoption of recommended standards.



covering non-ferrous metals, steel, and other mineral-related sectors (MIIT et al., 2024; SAMR et al., 2022).

Given China's advanced and diverse mineral processing and metallurgical technologies, policy-makers increasingly view the country as well-positioned to contribute to the formulation of ESG related technical standards, particularly for industrial and mineral processing activities (MIIT et al., 2024; State Council of the People's Republic of China, 2021b). China distinguishes between mandatory and recommended (voluntary) national standards, both of which are primarily implemented through self declaration and supervisory mechanisms.¹⁴ However, mandatory standards are subject to an additional layer of oversight: a statistical analysis and reporting system established under Article 29 of the Standardization Law of the People's Republic of China (Standardization Administration of China, 2025). This system enables authorities to systematically assess the implementation, applicability, and effectiveness of mandatory standards. In practice, the key distinction between mandatory and recommended standards lies less in day-to-day implementation mechanisms than in the legal consequences of non-compliance. Violations of mandatory standards may trigger administrative, civil, or criminal liability, whereas non-compliance with recommended standards generally carries no direct legal penalties unless such standards are incorporated into contracts or referenced in binding regulations.

In line with the overarching policy priorities described above, environmental management standards in China are generally more advanced than social and governance standards. This is the only ESG thematic area that includes national mandatory standards. Environmental standards have formed a multi-level system of national mandatory standards, sector-recommended standards, and local implementation rules, covering pollution prevention, resource utilization, greenhouse gas (GHG) emissions, and ecological protection. Through quantitative indicators, environmental standards emphasize quantifiable and verifiable data for compliance. Topics covered by environmental standards include environmental management systems, energy management systems, GHG emission accounting, green supply chain management, and industrial pollutant discharge.¹⁵

By contrast, social standards are scattered across various government departments, involving the Ministry of Human Resources and Social Security (labour), the Ministry of Emergency Management (work safety), the National Health Commission, the All-China Federation of Trade Unions, and sectoral regulators. Except for labour and production safety standards and occupational health regulations, ESG standards related to the "S" have been primarily embedded in voluntary national standards, with a tendency for a principle-based rather than prescriptive approach (Sausmikat, 2021).¹⁶

¹⁴ Appendix B provides a detailed overview of ESG-related national and sector standards applicable to mining and processing industries. Among them, national standards include 17 mandatory and 12 recommended standards; sector standards include seven mandatory and 10 recommended standards. These standards apply to mineral processing and mining enterprises within China but are not mandatory for Chinese companies operating overseas.

¹⁵ Including air pollutant discharge, wastewater and exhaust gas discharge, pollutant discharge from inorganic chemical industry, soil environmental quality, noise emission, storage and landfill of solid waste, storage of hazardous waste, tailings pond safety, green mine construction, green mine evaluation, surface water and groundwater environmental quality, ecological protection and restoration of mines, land reclamation, etc.

¹⁶ This is gradually changing domestically, especially in disclosure standards and company law reforms since 2023–2025, which introduce more specific expectations, even if enforcement remains flexible (Wambui, 2026).



Two key recommended social standards are Guidelines for Social Responsibility (GB/T 36000 2015)¹⁷ and Social Responsibility Management Systems—Requirements with Guidance for Use (GB/T 39604 2020). The Guidelines for Social Responsibility (GB/T 36000 2015) provide broad guidance for organizations on understanding and managing social responsibility and explicitly do not apply to certification, emphasizing voluntary uptake and adaptation to each organization’s size, industry characteristics, and operational conditions. Social Responsibility Management Systems (GB/T 39604-2020) establishes requirements and guidance for social responsibility management systems and is structurally aligned with International Organization for Standardization (ISO) management system standards, incorporating the ISO high-level structure and a “Plan-Do-Check-Act” cycle to facilitate compatibility with other ISO-based management systems.

In terms of the governance dimension of ESG, the main national recommended standards are Guidelines for Corporate Governance Risk Management (GB/T 26317-2010) and Compliance Management With Guidance for Use (GB/T 35770-2022). Besides being focused on listed companies, these are centred on compliance generally and do not include requirements relating specifically to environmental and social risk or impact management. Moreover, the Governance of Organizations – Guidance (GB/T 45948-2025),¹⁸ released in June 2025 and effective in January 2026, incorporates environmental and social impacts into risk management systems and strategy development, which aligns with the emerging expectations of the companies from external stakeholders.

3.3 Financial Regulatory and Disclosure Rules: From voluntary to mandatory, with gradually refined requirements

Besides general corporate management reporting requirements and environmental regulation, the Chinese ESG landscape has been heavily influenced by financial regulations and disclosure rules. The China Securities Regulatory Commission (CSRC) and stock exchanges have issued multiple policy documents, mainly in the form of “work guidelines” and “regulatory guidelines” (soft law), to guide and standardize listed companies in conducting ESG information disclosure and in promoting their ESG practices. ESG information disclosure requirements for listed companies in China have gone through an evolution from voluntary disclosure, via semi-mandatory disclosure, to phased mandatory disclosure, with the disclosure requirements becoming increasingly stringent.

The Hong Kong Exchanges and Clearing Limited (HKEX) released the *ESG Reporting Guide* in 2013 to provide voluntary disclosure recommendations for listed companies (HKEX,

¹⁷ The abbreviation “GB/T” refers to recommended national standard while “GB” refers to mandatory national standard.

¹⁸ The concept of an organization includes, but is not limited to, individual operators, companies, group companies, commercial firms, enterprises, administrative agencies, partnership enterprises, charitable organizations, or research institutions, or parts or combinations of the aforesaid organizations, regardless of whether they have legal personality, and whether they are publicly owned or privately owned.



2013).¹⁹ In 2019, it revised and completed a new version of the guide, expanding the scope to include mandatory disclosure by adjusting all disclosure recommendations to a “comply or explain” approach for listed companies in Hong Kong. To align with international standards, HKEX has gradually revised climate information disclosure requirements and completed the revision of the ESG Reporting Code in 2024.

In 2024, under the guidance of the CSRC, the Shanghai Stock Exchange, Shenzhen Stock Exchange, and Beijing Stock Exchange formulated and issued the *Guidelines for Sustainable Development Reports of Listed Companies* (上市公司信息披露管理办法)(中国证监会令226号). The guidelines stipulate that specific types of listed companies²⁰ must “disclose” (披露) their ESG performance in sustainability reports.²¹ Listed holding companies that are subject to ESG reporting must also report on the performance of their “significant subsidiary companies” (including those operating overseas) with annual net profit or investment income exceeding 10% of the corresponding item in the holding company’s consolidated financial statements. The guidelines require disclosure of ESG reports for the 2025 fiscal year, starting in 2026. They outline 21 topics²² and set differentiated disclosure requirements for different topics through a combination of qualitative and quantitative methods, as well as mandatory and encouraging measures.

According to statistics from the China Association for Public Companies (2024), a total of 412 listed companies met the mandatory disclosure criteria under the guidelines in 2024. From 2022 to 2024, most mandatory disclosure entities have disclosed sustainability reports, reaching a disclosure rate of 94.42% (389 companies) in 2024. It is worth pointing out that the category of the mining sector (采矿业 in Chinese) showed disclosure rates rising from approximately 60% to 70% (2022–2024), consistently ranking third or fourth among all industries. However, it should be noted that China’s classification of the mining sector encompasses oil and gas extraction but excludes mineral processing—a scope that differs from many international mining sector definitions. In addition, according to statistics from relevant scholars based on sample data of 133 A-share listed mining companies in China, the ESG information disclosure rate of Chinese mining enterprises has shown a gradual upward trend in recent years. The disclosure rate reached 72.18% in 2024, an increase of 10.35% compared to 2023 and 53.97% compared to a decade ago (Zhang Fuliang et al., 2025).

In 2025, the CSRC issued the Measures for the Administration of Information Disclosure by Listed Companies. For the first time, it required listed companies at the departmental regulatory level to issue sustainability reports in accordance with the regulations of stock exchanges, marking that the ESG information disclosure requirements for listed companies

¹⁹ It should be noted that HKEX defines “mineral companies” as entities whose primary activity is the exploration and extraction of minerals **or petroleum**—a definition aligned with the Chinese Industrial Classification issued by the National Bureau of Statistics. Consequently, “mineral companies” includes oil and gas extraction firms, while explicitly excluding mineral processing and refining companies (HKEX, 2013).

²⁰ These companies include those that are part of key market indices such as the SSE 180 Index, STAR 50 Index, SZSE 100 Index, ChiNext Index, and companies listed simultaneously domestically and abroad.

²¹ The guidelines state that certain types of listed companies (see footnote 10) ought to publish either 1) sustainability reports or 2) ESG reports. The guidelines later explicitly refer to both types of reports as sustainability reports, meaning the two types are interchangeable throughout the guidelines.

²² See specific topics in Shanghai Stock Exchange, 2024.



(and their significant overseas subsidiaries) had entered a new stage of mandatory disclosure. In addition, in 2021, the Ministry of Ecology and Environment (MEE) of China issued the Reform Plan for the Legal Disclosure System of Environmental Information” (环综合[2021]43号), which proposed that a mandatory environmental information disclosure system should be formed by 2025 and proposed mandatory requirements for environmental information to be incorporated into the declaration rules of Initial Public Offering for listed companies in all Chinese stock exchanges.²³ At the time of this writing, the MEE has yet to publish the new information disclosure system.

Figure 1. Overview of China’s ESG framework

 ENVIRONMENTAL Protecting the planet & promoting sustainability	 SOCIAL Ensuring fair practices & community well-being	 GOVERNANCE Upholding transparency & ethical leadership
 Mandatory • Environmental Protection Law (2015) • Law on EIA (2002) • Standardization Law (2017) • 17 National/Sector Mandatory Standards	 Mandatory • Company Law - Stakeholders (2024) • Labor & Production Safety	 Mandatory • CSRC Disclosure Measures (2025) • Stock Exchange SD Guidelines (2024) • Company Law - Transparency (2024) • HKEX ESG Reporting Guide/Code
 Voluntary (soft law) • Opinions on Beautiful China (2023) • Green Transformation Opinions (2024) • Green/Low-carbon Std Plan (2025) • Carbon Peak Implementation Plan (2022) • Environmental Disclosure Reform (2021)	 Voluntary (soft law) • Social Stability Risk Measures (2013/19) • GB/T 36000-2015 (<i>Social Responsibility</i>) • GB/T 39604-2020 (<i>SR Management</i>) • SASAC SOE Social Responsibility (2008/16)	 Voluntary (soft law) • SASAC ESG Guiding Opinions (2024) • GB/T 26317-2010 (<i>Governance Risk</i>) • GB/T 35770-2022 (<i>Compliance</i>) • GB/T 45948-2025 (<i>Org Governance</i>)

Source: Authors’ compilation.

²³ A full list of companies include key pollutant-discharging units; enterprises subject to mandatory cleaner production audits; listed companies and bond-issuing enterprises that have been held criminally liable or received significant administrative penalties for violations of ecological and environmental laws; and other enterprises and public institutions required by laws, regulations, and other provisions to carry out mandatory disclosure of environmental information.



4.0 Chinese Overseas Mining and Processing Operators: Between voluntary guidelines and international standards

The Chinese economy remains highly dependent on sourcing minerals from abroad to process for both domestic manufacturing and the export of value-added products. For instance, China is the number one importer of copper ores and concentrates in the world, with 57% share of global imports by net weight (Massot, 2024, p. 212). With regards to nickel, China's import dependence rate has stayed above 80% since 2008 (Wang & Xia, 2024).²⁴

At the same time, Chinese mining companies, backed and promoted by the government, have significantly expanded their overseas investment over the past decade, building a global footprint across extraction and—more recently—refining and smelting capacity. On the one hand, the growing share of overseas mine ownership has contributed to China's resilience and strengthened its clout over mineral supply chains (Wang & Allan, 2025). On the other hand, as Chinese firms have become major international producers, they have also been exposed to greater public scrutiny and rising expectations from host governments, customers, and international markets regarding responsible business conduct and supply chain due diligence (Castillo & Purdy, 2022).

In support of responsible business practices in overseas operations, Chinese government bodies have issued a series of voluntary guidelines for Chinese companies abroad, which are broadly aligned with international norms in the field, including the *Guidelines for Compliance Management of Enterprises' Overseas Operations* (NDRC et al., 2018), the *Guidelines for Green Development of Foreign Investment Cooperation* (MOFCOM, 2021), and the *Guidelines for Ecological and Environmental Protection in Overseas Investment, Cooperation and Construction Projects* (MEE, 2022). In addition, a specific *Implementation Plan for High-Quality Development of the Copper Industry* was issued in 2025, which provides guidance on how Chinese companies should fulfill social responsibilities, encouraging public welfare activities in host countries to foster good community relations (MIIT, 2025b). These government guidelines on overseas responsible business practices are not legally binding but reflect the state's commitment to improving the ESG performance of Chinese investment and companies abroad and the ambition for China to be recognized as a responsible development partner (Chen, 2024; Park, 2023).

At the same time—and driven primarily by market and customer requirements rather than regulation—a small but growing number of Chinese mining and processing companies operating overseas have begun to engage with international ESG standards and assurance schemes. For one, Chinese companies have been actively following regulatory developments in key export markets such as the United States and Europe, in terms of due diligence and

²⁴ Raw materials imported to be refined in China are estimated to be 45% to 50% for copper and 65% to 75% for nickel (Index Bax, 2026; Zadeh, 2025).



traceability requirements, and have provided important incentives to join international business alliances focused on sustainability and responsible business (Lang & Rudyak, 2022).

Since around 2023, a growing number of Chinese copper and nickel refiners—particularly those integrated into global battery and metals supply chains—have participated in formal supply chain due diligence assessments recognized by international market institutions such as the LME and the Responsible Minerals Initiative (RMI). Participation in these assessments is primarily driven by downstream customer requirements and by the need to maintain market access, investment eligibility, and project finance for overseas mining and processing assets.

To date, Tenke Fungurume Mining S.A. (TFM)—a copper cobalt mine in the Democratic Republic of the Congo (DRC) majority owned by CMOC Group—is the most advanced case: TFM holds The Copper Mark certification and is currently undergoing an independent, third party assessment against the Initiative for Responsible Mining Assurance (IRMA) Standard for Responsible Mining (Constance, 2024; IRMA, 2025). In Indonesia, several Chinese backed nickel processors have completed ESG related supply chain audits under the RMI. These include PT Debonair Nickel Indonesia and PT Zhongtsing New Energy, both subsidiaries of CNGR Advanced Material, which have been assessed under RMI's Responsible Minerals Assurance Process (Aninda Lestari, 2024).

4.1 Guidelines for Social Responsibility in Outbound Mining Investments

A pivotal actor in the Chinese industry standards landscape for mineral supply chains is the China Chamber of Commerce of Metals, Minerals & Chemicals Importers and Exporters (CCC MC), established in 1988. It is a national, industry-specific, and non-profit social organization²⁵ composed of entities engaged in economic activities related to metallic and non-metallic minerals and products, hardware products, building materials, petroleum and products, chemical raw materials and products, and the upstream and downstream industrial chains in these fields. Since 2010, the CCC MC has been engaged in work related to ESG in the mining industry and supply chain due diligence management.

Against the backdrop of increasingly active international investment in the development of mineral resources and the accelerated implementation of the “going global” strategy by Chinese companies, in 2014 the CCC MC initiated a *Guidance for Social Responsibility in Outbound Mining Investments* (中国对外矿业投资行业社会责任指引, hereinafter referred to as the GSRM), which was officially released in 2017. The GSRM is a voluntary instrument designed to incentivize Chinese companies engaged in overseas mining investment and

²⁵ According to the civil affairs sector standard Social Organizations—Vocabulary (MZ/T 211–2024), social organizations (社会组织) include social groups, foundations, and social service organizations that are registered in accordance with Chinese laws and regulations governing the registration and administration of social organizations. Social groups are non-profit legal persons voluntarily formed by Chinese citizens to pursue the common objectives of their members and to carry out activities in accordance with their charters. (Note: Entities other than state organs may also join social groups as members.) Social service organizations are non-profit legal persons established by enterprises, public institutions, social groups, other social actors, or individual citizens using non-state-owned assets for public welfare purposes. They operate in accordance with their charters and engage in social service activities. The CCC MC is classified as a social group under this framework.



cooperation to formulate clear strategies and establish internal governance mechanisms in the fields of social responsibility and sustainable development.

4.1.1 Scope of Application

The GSRM includes within its scope all activities of Chinese companies involving overseas mineral exploration, mining, processing, and investment cooperation. The GSRM includes ESG requirements covering eight topics: organizational governance, fair operating practices, supply chain management, human rights, labour practices, occupational health and safety, environmental management, and community development, with a total of 57 indicators (CCCCMC, 2017).

The GSRM encourages risk management by Chinese companies engaged in the minerals sector overseas by identifying priority ESG issues they should manage. The GSRM also promotes the conduct of ESG management and encourages disclosure of responsibility performance information (CCCCMC, 2017).

4.1.2 Implementation Progress

The CCCMC compiled an *Implementation Manual for the GSRM* in 2018 along with additional assessment tools to support industry use and self-assessment, as well as external assessments of ESG management against the standard. These instruments aim to enable companies to identify gaps, formulate and implement improvement measures, and gradually enhance ESG performance.

The CCCMC has also held training sessions, seminars, and exchange meetings to encourage Chinese companies operating in the minerals sector, both in China and overseas, to assess their current ESG management systems against the GSRM. The CCCMC has also conducted a pilot assessment against the GSRM for one domestic mining company. However, the GSRM has not yet been adopted more widely by companies in the industry, as GSRM and its accompanying assessment program need further international recognition. Launched in 2017, the GSRM is a first step only and requires further improvement to align with international regulations, which is why the CCCMC has engaged in a stakeholder consultation process to reflect recent trends in international ESG requirements into an updated standard. To this end, in September 2025, the CCCMC signed Memorandums of Understanding with RMI, the Copper Mark, and IRMA for standard benchmarking and future mutual recognition at the International Forum on Sustainable Mineral Supply Chain in Xiamen (CCCCMC, 2025). The CCCMC completed a full upgrade of the GSRM and released the updated *Sustainable Mining Code* for public consultation in March 2026.

4.2 Chinese Due Diligence Guidelines for Mineral Supply Chain

In 2015, the CCCMC collaborated with the OECD to compile the first edition of the *Chinese Guidelines for Responsible Mineral Supply Chain Due Diligence in China*, (中国负责任矿业供应链尽责管理指南) (hereinafter referred to as GDDM) (CCCCMC, 2015). Focusing on supply



chain due diligence, the GDDM aims to guide enterprises in identifying, preventing, and mitigating risks, and in avoiding direct or indirect adverse impacts, such as severe human rights violations, conflicts, environmental damage, and breaches of business ethics.

In 2020, the CCCMC began a process of revising the GDDM with reference to the OECD's *Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas* (3rd edition) and ISEAL Alliance's *Good Practice Handbook for Setting Social and Environmental Standards*. The revised GDDM refined requirements for corporate due diligence, adding a sixth step:²⁶ “providing real-time conditions or collaborating to implement remedies” (CCCMC, 2015) and incorporated core content from international standards, rules, and initiatives that apply to mineral supply chains. This second edition was released in May 2022, with the official title *Chinese Due Diligence Guidelines for Mineral Supply Chain (Second Edition)* (中国矿产供应链尽责管理指南(第二版)) (see CCCMC, 2022).

The CCCMC further developed a supply chain due diligence assessment tool specifically for mineral processing companies based on the GDDM 2.0, along with a systematic assessment process.

In July 2022, GDDM 2.0 completed the LME's conformity assessment and was granted conditional approval for Track A under the LME Responsible Sourcing Requirements, making it the first standard developed by an institution from a non-OECD country to receive such recognition.

4.2.1 Scope of Application

The GDDM 2.0 applies to Chinese enterprises across the mineral supply chain, including

- upstream and midstream activities (e.g., exploration, mining, processing, trading, storage and transportation) and
- downstream activities that use minerals and related products (e.g., electronics, electrical appliances, instrumentation, jewellery manufacturing, and communication equipment), but excluding service providers (e.g., transporters, warehouses, and packaging suppliers).

²⁶ The 2015 GDDM set out five steps to develop a due diligence framework: (i) establish a due diligence system; (ii) identify and assess risks; (iii) prevent and mitigate risk; (iv) carry out internal and external assessment; (v) communicate and report risk management processes and results (CCCMC, 2015).



GDDM 2.0 addresses two categories of risks: Type 1 risks refer to the “risks of contributing to conflict and serious abuse of human rights associated with extracting, trading, handling and exporting minerals from conflict-affected and high-risk areas” and Type 2 risks refer to “widely concerned environmental and social risks associated with [sic] mineral supply chain” (CCCCMC, 2022, pp. 54).²⁷

4.2.1 Implementation Progress

The CCCMC provides ongoing training, industry exchanges, and guidance on GDDM 2.0, actively promoting its adoption by companies in the mineral supply chain, including mines, mineral processors, battery material processors, and battery factories. In June 2023, the CCCMC officially launched a mineral supply chain due diligence assessment project that supports the implementation of the GDDM.

As of June 2024, 65 Chinese companies had participated in the CCCMC’s assessment program, covering seven types of metal processing (copper, aluminum, lead, zinc, tin, nickel, and cobalt), with geographical coverage in four countries: China, the DRC, Indonesia, and Zambia.

GDDM 2.0 take-up was supported by the implementation of the LME’s Responsible Sourcing Policy around the same time, which required that companies with LME-registered metal brands must conduct and pass the supply chain due diligence assessment by the end of 2023 to be allowed to continue delivery. This served to incentivize Chinese refiners of seven metals (copper, aluminum, lead, zinc, tin, nickel, and lithium) to establish supply chain due diligence systems and participate in third-party assessments.

Currently, the enterprises applying for the CCCMC’s assessment program are mainly those with LME-registered metal brands. Among all enterprises with LME-registered brands, 56 chose to be assessed in accordance with GDDM 2.0, making it the most widely adopted standard among the nine LME-recognized standards (LME, 2024).²⁸ These companies have strengthened their due diligence governance by establishing specific policies and dedicated departments, including in supply chain risk management and transparency, improved information disclosure, stakeholder communication, and grievance mechanisms.

The LME has not yet completed the alignment assessment of the implementation process of the CCCMC’s assessment program. The LME operates a two-step alignment and implementation pathway to recognize standards. The first step consists of documentary alignment against the OECD Due Diligence Guidance. The second step consists of the

²⁷ Type 1 risks under GDDM 2.0 are substantively aligned with Appendix II of the OECD Due Diligence Guidance and function as a localized transposition of the OECD’s conflict-affected and high-risk areas logic into Chinese regulatory language. They require management as the minimum requirement for corporate supply chain risk management, while the latter risk category is subject to further recommendations. Type 2 risks are broader and involve softer, ESG-oriented, often process-based controls. They mainly include negative impacts on the environment; negative impacts on human rights, labour rights, communities, and society; and adverse effects on the equitable economic development of host countries and the livelihoods of local communities. Enterprises are encouraged to further reference the GSRM for comprehensive ESG management and information disclosure.

²⁸ Based on the authors’ analysis of LME, 2024.



assessment of the assurance system behind the standard (e.g., auditor capacity, audit quality across jurisdictions, grievance handling, etc.). Currently, only the Joint Due Diligence Standard co-developed by LME and the OECD has been operationally recognized for the second step. All other standards under alignment assessment, including those of the CCCMC, have only been recognized for step one. Nevertheless, companies are still willing to continue participating in the assessment program based on GDDM 2.0 to meet the LME's mandatory supply chain due diligence assessment requirements. It is also notable that the CCCMC's current assessment programs only assess enterprises' management of Type 1 risks (to align with the scope of the OECD Guidelines). The assessment does not yet cover Type 2 risks relating to broader ESG aspects.

4.3 Other Policies and Standards Applicable to Chinese Overseas Mining and Processing Operations

4.3.1 ESG Disclosure Guidelines for Non-Ferrous Metal Enterprises

In addition to the CCCMC, the China Non-Ferrous Metals Industry Association (CNIA), established in 2001, is also an influential organization that plays an important role in communication between the government and enterprises, the development of industry standards, and the promotion of policy implementation. It is a national, non-profit, industry-specific economic social organization composed of enterprises, public institutions, and social organizations in China's non-ferrous metals industry (which includes nickel). In 2024, the CNIA set up the Environmental, Social and Governance Research Center to promote the disclosure of sustainable development information in the industry through the formulation of information disclosure standards, ESG performance ratings, and ESG report assurance.

In 2024, the CNIA released Guidelines for ESG Information Disclosure of Non-Ferrous Metal Enterprises (有色金属企业环境、社会及治理信息披露指南) (hereinafter referred to as GIDM), which took effect starting September 2024. The GIDM aims to standardize the ESG information disclosure behaviour of non-ferrous metal enterprises, improve industry transparency and its sense of responsibility, and promote the sustainable development of the industry. The CNIA's ESG Research Center will further develop assurance standards and services.

The GIDM applies to enterprises engaged in non-ferrous metal mining and processing. Although it does not explicitly specify whether it applies to enterprises operating domestically or abroad, non-ferrous metal enterprises operating overseas can also refer to it for ESG information disclosure. The GIDM covers 16 ESG issues²⁹ and categorizes reporting items as "should disclose" and "appropriate to disclose." "Should-disclose" items refer to necessary items for disclosure; if these items are not included in the report, the enterprise will need to

²⁹ The 16 ESG issues are: E1 Resource Consumption, E2 Pollution Prevention and Control, E3 Climate Change and Carbon Management, E4 Environmental, Ecological and Resource Protection; S1 Employee Recruitment, S2 Occupational Health and Safety, S3 Employee Development and Training, S4 Products and Services, S5 Sustainable Supply Chain, S6 Research and Development as well as Innovation, S7 Community Co-construction, S8 Social Contribution; G1 Corporate Governance, G2 Compliance and Risk, G3 Stakeholder Engagement, and G4 Business Ethics.



provide a valid justification for exemption. “Appropriate-to-disclose” items are encouraged to be disclosed, but are optional.

Since the GIDM was recently released, it has not yet been widely adopted, although some listed Chinese companies have shown interest. According to interviews, the CNIA hopes to promote GIDM adoption to more non-ferrous metal enterprises, explore mutual recognition with international standards, and strengthen cooperation with international standard-setting organizations.

Table 1. Overview of Chinese VSSs applicable to overseas companies

	GSRM	GDDM 2.0	GIDM	Overseas environmental guidelines
Title (Standard)	Guidance for Social Responsibility in Outbound Mining Investments	Chinese Due Diligence Guidelines for Mineral Supply Chain (GDDM 2.0)	ESG Disclosure Guidelines for Non-Ferrous Metal Enterprises (GIDM)	Guidelines for Overseas Environmental Protection
Initiator/ year	CCCCMC Released: 2017	CCCCMC Revision: 2022	CNIA Released: 2024	MEE & MOFCOM Issued: 2022
Scope	Chinese entities in overseas mineral exploration, mining, processing, investment	Chinese enterprises across mineral supply chain (exc. service providers)	Enterprises in non-ferrous metal mining & processing. Applies broadly.	Overseas investment, construction projects, including mineral extraction
Core areas/risks	8 key ESG topics (Governance, Human Rights, Labour, Environment, Community)	Type 1 (Conflict/ Human Rights - Minimum) Type 2 (Env/Social)	16 key ESG issues for standardized disclosure	Explicitly encourages adopting international best practices where relevant.
Key highlights/ progress	Internal governance focus. MoUs for standard benchmarking.	OECD Collaboration. LME Track A conditional approval.	“Should-disclose” and “Appropriate-to-disclose” items.	Comply with host country laws.

Source: Authors’ compilation.

4.3.2 Guidelines for Overseas Environmental Protection

At a higher policy level, in 2022, the MEE and Ministry of Commerce (MOFCOM) co-issued the *Guidelines for Ecological and Environmental Protection in Overseas Investment, Cooperation and*



Construction Projects (MEE & MOFCOM, 2022).³⁰ The guidelines repeat the default Chinese position that Chinese companies should comply with the environmental laws and regulations of each host country they operate in. However, beyond that, one crucial innovation compared to earlier Chinese policy guidance for overseas operations is that these guidelines explicitly encourage companies to adopt international best practices or Chinese standards where relevant regulations are lacking or lower than Chinese domestic standards. The guidelines apply to new construction (including renovation and expansion) projects, acquisition and merger projects, and contracted engineering projects undertaken by Chinese enterprises investing and constructing abroad, but also explicitly include mineral extraction projects (矿山开采) in their scope of application (Article 12) (MEE, 2022).

³⁰ These 2022 guidelines build on and specify earlier guidelines.



5.0 The Adoption of International and Chinese Sustainability Standards in Chinese Companies: A comparative analysis

Following the introduction to relevant ESG management frameworks at the global level and within China, this section proceeds with a comparative benchmarking analysis of a selected international ESG standard and Chinese standards applicable to Chinese nickel processing companies.

5.1 Objective and Methodology of the Comparative Analysis

As explained in Section 3, the two most relevant Chinese VSSs are the GSRM and the GDDM. To better understand their level of international alignment and relevant gaps, two leading international VSSs were selected as benchmarks: IRMA's Draft Standard for Responsible Mining and Mineral Processing 2.0 (IRMA 2.0)³¹ and the Copper Mark's Risk Readiness Assessment Criteria 3.0 (RRA 3.0). These standards were selected due to their comprehensive coverage of ESG issues, the ambition of their requirements, and their broad multistakeholder buy-in as standards that have recently undergone rounds of extensive international multistakeholder consultation. While no VSS perfectly addresses the management of ESG risks, and recognizing that they are not a substitute for international and national environmental and social protection laws and government regulation of mining activities, IRMA 2.0 and RRA 3.0 do provide a detailed benchmark for widely accepted principles of good industry ESG practice.

The qualitative assessment compares IRMA 2.0 and RRA 3.0 against GSRM³² and GDDM in their scope of topics covered and the principles and requirements embedded in them. The qualitative assessment of the sub-components of the standards compared (e.g., principles, chapters, criteria, and requirements) is then aggregated to provide an alignment score, presented as a percentage. The following terminology is used in the qualitative assessment classification:

- **aligned:** where the scope, intent and principle of the requirements are the same, even if there are minor differences in the details of the requirement
- **partially aligned:** where the scope, intent and principle of the requirement are similar but with different details or indicators

³¹ Public consultation on the IMRA 2.0 standard was completed in October 2025. As of the time of writing, IRMA 2.0 has not yet been finally released, yet its approach to covering the full mineral life cycle crucially distinguishes it from the mine site-focused IRMA 1.0 standard currently still in use (see below, Section 5.2).

³² The benchmark exercise was conducted using the original GSRM. CCCMC released an updated Sustainable Mining Code for public consultation in March 2026, after the analysis for this study had concluded.



- **not aligned:** requirements that are beyond the scope of the standard

The benchmark exercise does not assess the rigour or quality of the VSSs' reporting and compliance systems, including audit and assurance processes. Nor does it assess the governance structures of the VSS-setting organizations. An “aligned” score does not guarantee that the level of scrutiny and transparency in reporting requirements is similar. Furthermore, the Chinese standards analyzed are corporate-level guidelines, while IRMA 2.0 is facility-level, so the level of specificity in implementation varies and is not accounted for in the alignment score.

5.2 Selected International Standards: IRMA 2.0 and RRA 3.0

5.2.1 IRMA's Standard for Responsible Mining and Mineral Processing 2.0

IRMA, founded in 2006, is a VSS-setting body that features a multistakeholder governance model where decision making is equally shared by a set of different stakeholder groupings, including mining companies, companies that purchase mined materials to make other products, NGOs, affected communities, organized labour, and investment and finance.

IRMA released its Standard for Responsible Mining Version 1.0 in 2018, which focused on mining sites. IRMA's Draft Standard Version 2.0 was initially released for consultation in 2023 and completed the second consultation round in October 2025 (IRMA, 2023). Importantly, this updated iteration has a broader scope and covers mining-related activities from exploration to mineral processing. For instance, IRMA 2.0 introduces new requirements for mineral processing operations to apply a chain of custody and/or traceability system. The updated standard also includes a new chapter on upstream and downstream sustainability due diligence, requiring risk assessment and management plans to avoid harm caused by actors in the operator's supply chain. IRMA 2.0 contains 28 criteria and 510 requirement indicators, arranged across four themes: Business Integrity, Planning for Positive Legacies, Social Responsibility, and Environmental Responsibility (see Appendix C). The IRMA standard is designed for continuous improvement and specifies levels of performance against certain critical requirements, such that a site that is operating according to best practice could reasonably be expected to conform with all the requirements (IRMA, 2023).³³

Important downstream actors like Volkswagen, Mercedes-Benz, BMW, Tesla, and Ford are IRMA members, supporting its standards and assessment as a useful factor in their sourcing decisions. So far, two mine sites in Indonesia are undergoing independent audit against IRMA 1.0: Harita Nickel operated by Trimegah Bangun Persada³⁴ and Sorowako operated by PT

³³ This would be the IRMA 100 achievement level. IRMA 75, IRMA 50, and IRMA Transparency are lower achievement levels. Scores are derived from independent audits based on whether each requirement is fully met, substantially met, partially met or not met.

³⁴ It's worth noting that Trimegah Bangun Persada is a joint-venture with Chinese company Lygends Resource, PT Halmahera Persada Lygend, an HPAL nickel refining and battery-grade nickel sulfate production facility.



Vale Indonesia Tbk. Meanwhile, Weda Bay Nickel, operated by PT Weda Bay Nickel, is in the process of self-assessment and, at the time of writing, has yet to enter the independent assessment phase.

5.2.2 The Copper Mark's Risk Readiness Assessment Criteria Guide 3.0

The Copper Mark is an industry-led initiative launched in 2020 with the vision of ensuring responsible production in the copper supply chain. In 2023, their scope expanded to include nickel, molybdenum, and zinc supply chains, in collaboration with the Nickel Institute, the International Molybdenum Association, and the International Zinc Association, respectively.

The RRA Criteria Guide, also known as The Copper Mark Criteria for Responsible Production, is a set of 33 criteria that serve as a common standard of reference for ESG practices in mineral supply chains. The Copper Mark collaborated with the RMI to create the RRA 3.0, which was released in 2024 (see Appendix D) (The Copper Mark & RMI, 2023).

The Copper Mark started their assessment program in 2020, and by the end of 2024, 111 sites (mines or processing sites) had been assessed, of which, 77 obtained The Copper Mark and seven The Nickel Mark. As of June 2025, there were three copper mines in the DRC awarded The Copper Mark, namely Tenke Fungurume Mining S.A operated by Chinese company CMOC Group Limited, and Mutanda Mining SARL and Kamoto Copper Company S.A., both operated by Glencore Plc (Switzerland).

5.3 Results of the Comparative Analysis

This section presents the benchmarking results for IRMA 2.0 and the selected Chinese ESG standards, followed by an analysis of alignment levels and remaining gaps.

5.3.1 Benchmark Result for IRMA 2.0 and the GSRM and the GDDM

In terms of the topics and indicators covered, the benchmark exercise finds that the two Chinese VSSs taken together 74% aligned with IRMA 2.0 overall, 15% are partially aligned, and 11% not aligned (see Table 2). There is variance in the degree of alignment across the four main IRMA 2.0 principles, in decreasing order: Business Integrity, Social Responsibility, Environmental Responsibility, and Planning for Positive Legacies. Notably, these gaps in alignment are in coverage and do not refer to alignment in terms of the governance and assurance mechanisms.

**Table 2.** Summary of the benchmark exercise for IRMA 2.0

IRMA 2.0	Requirement indicators	Aligned	Partially aligned	Not aligned
Principle 1: Business Integrity	62	52	10	0
Principle 2: Planning for Positive Legacies	136	85	26	25
Principle 3: Social Responsibility	149	119	25	5
Principle 4: Environmental Responsibility	163	121	14	28
Total	510	377	75	58
As %		74%	15%	11%

Source: Authors' analysis.

Looking more closely at where the main gaps in Chinese ESG standard coverage are, the benchmark exercise finds that, out of a total of 510 individual requirement indicators in IRMA 2.0, there are 58 where Chinese ESG standards are “not aligned.” These gaps span 10 chapters across three principles, with the majority found in Environmental Responsibility and Planning for Positive Legacies. Table 3 provides an overview of the main gaps in Chinese standards vis-à-vis IRMA 2.0. For a more detailed analysis of non-aligned requirements indicators with a rationale for the assigned alignment score, please refer to Appendix E.

**Table 3.** Main gaps in the GSRM and GDDM compared with IRMA 2.0

IRMA principle	IRMA chapter title	Non-alignment rationale: Gaps in the GSRM and the GDDM
2. Planning for Positive Legacies	2.2 Indigenous Peoples and Free, Prior and Informed Consent (FPIC)	Identification of and engagement with Indigenous Peoples
		Processes for reaching agreements on past impacts and seeking FPIC for proposed activities
	2.4 A - Proposed Historical Land Acquisition, Displacement, and Resettlement	Community engagement
		Specific measures related to economic displacement
		Resettlement and livelihood restoration agreements and implementation
		Resettlement and livelihood restoration monitoring and evaluation
	2.4 B - Historical Land Acquisition, Displacement, and Resettlement	Community engagement
		Displacement remediation monitoring and evaluation
	2.5 Community Emergency Preparedness and Response	Public liability accident insurance
	2.6 Planning and Financing Reclamation and Closure	Reclamation and closure planning
		Backfilling as a part of reclamation
3. Social Responsibility	3.1 Fair Labour and Terms of Work	Wages, benefits, and other compensation
	3.2 Occupational Health and Safety	Health and safety management plans and procedures
		Specific measures to protect workers
4. Environmental Responsibility	4.2 Water Management	Water management planning and implementation
		Water monitoring program
		Comparison of monitoring results to water quality/quantity criteria



IRMA principle	IRMA chapter title	Non-alignment rationale: Gaps in the GSRM and the GDDM
	4.X Management of Physical Stability	Scoping of facilities with potential physical stability risks
		Management of physical stability at non-critical facilities
		Initial assessment, siting and design of critical facilities
		Management of physical stability risks at critical facilities
		Critical facility oversight and review processes
		Reporting and disclosure
	4.XX Land and Soil Management	Comparison of monitoring results to soil chemical quality criteria

Source: Authors' analysis.

Under the IRMA principle of Planning for Positive Legacies, a key gap in the two Chinese VSSs is the lack of FPIC-related requirements for Indigenous Peoples. This demographic group is not included in the GSRM or the GDDM. In addition, the two Chinese VSSs are weaker in their requirements around community engagement with affected and displaced communities. They lack specific standards to address economic displacement, resettlement, and livelihood restoration, as well as displacement remediation monitoring for historically displaced communities. Other important gaps in the two Chinese VSSs include no requirements for public liability accident insurance or reclamation and closure implementation and no requirements on the financial assurance of reclamation and closure.

There is greater alignment across the VSSs in relation to the “Social Responsibility” pillar, yet there are some gaps in relation to workers’ benefits and occupational health and safety (OHS). For instance, the GSRM and GDDM lack specific requirements for compensation for work-related injuries and illnesses, deductions from wages, and accommodation standards.

Finally, under Environmental Responsibility, there are gaps in relation to water management requirements. This includes the links between water management, FPIC, and community engagement. In addition, there are gaps in requirements for water monitoring programs and water quality and quantity criteria. Similarly, there are no specific requirements in the two Chinese VSSs for soil quality monitoring. There are also several gaps in the management of physical stability, including in the scoping, design, management, oversight, and reporting and disclosure. However, this disparity may be attributed to IRMA’s facility-level focus, while the two Chinese VSSs focus on the corporate level.



5.3.2 Benchmark Result for RRA 3.0 and the GSRM and the GDDM

In terms of the topics and criteria covered, the benchmark exercise finds that the two Chinese VSSs taken together are 76% aligned with RRA 3.0 overall, with the remaining 24% of criteria partially aligned (see Table 4). There is variance in the degree of alignment across the three pillars of RRA 3.0 principles, in decreasing order: governance, environment, and social. Again, these gaps in alignment are in coverage and do not refer to alignment in terms of the governance and assurance mechanisms.

Table 4. Summary of benchmark exercise for IRMA 2.0

RRA 3.0	Criteria	Aligned	Partially aligned	Not aligned
Governance	10	9	1	0
Social	15	10	5	0
Environment	8	6	2	0
Total	33	25	8	0
As %		76%	24%	0%

Source: Authors' analysis.

Looking more closely at the Chinese ESG standards' main gaps in coverage, the benchmark exercise finds that, out of 33 individual criteria in RRA 3.0, eight Chinese ESG standards are "partially aligned." The majority of partially aligned criteria are in the social pillar, followed by environment and governance. Table 5 provides an overview of the main gaps in Chinese standards vis-à-vis RRA 3.0.

Table 5. Main gaps in the GSRM and GDDM compared with RRA 3.0

RRA pillar	RRA criteria	Partial alignment rationale: Gaps in the GSRM and the GDDM
Governance	10. Responsible Supply Chain	Chinese standards propose ESG management requirements but do not explicitly require risk-based due diligence on ESG issues in the supply chain. They only require due diligence on extreme forms of human rights violations in the supply chain.
Social	13. Freedom of Association and Collective Bargaining	Chinese standards do not specifically require a comprehensive due diligence process for freedom of association and collective bargaining but focused on describing the need to respect workers' rights to freedom of association.



RRA pillar	RRA criteria	Partial alignment rationale: Gaps in the GSRM and the GDDM
	14. Non-Discrimination and Harassment	Chinese standards do not specifically require a comprehensive due diligence process for non-discrimination and anti-harassment but focuses on describing the need to respect workers' rights to freedom of association.
	15. Diversity, Equity and Inclusion	Chinese standards do not propose detailed requirements for the participation of under-represented groups.
	21. Artisanal and Small-Scale Mining (ASM)	Chinese standards do not propose specific requirements for risk identification and management of ASM.
	22. Security and Human Rights	Chinese standards do not propose specific requirements for the implementation of management systems and remedial measures.
Environment	30. Circular Economy	Chinese standards do not cover specific requirements for conducting supply chain due diligence on waste materials.
	31. Tailings Management	Chinese standards do not require companies to carry out tailings management in accordance with the Global Industry Standard on Tailings Management.

Source: Authors' analysis.

Overall, there is a greater degree of alignment between RRA 3.0 and the GSRM and the GDDM. Partial alignment across RRA criteria is largely due to a lower degree of specificity or detail in the Chinese standards. For example, in the governance pillar, Chinese standards do not explicitly require risk-based due diligence on ESG issues in the supply chain. They provide due diligence guidance only on a narrow scope, covering only the most extreme forms of human rights violations.

It is significant that most partially aligned criteria fall under the social pillar. There is a lack of specific guidance in Chinese standards on important aspects of workers' rights, including in the freedom of association and collective bargaining, as well as non-discrimination and anti-harassment, and there is no specific guidance on the participation of under-represented groups. China's ratification of core International Labour Organization (ILO) conventions—such as non-discrimination (C111), minimum age (C138), worst forms of child labour (C182), labour inspection (C081) and, since 2022, forced labour prohibitions (C029 and C105)—has contributed to relatively detailed statutory labour protections applicable to mining. These protections include OSH rules, wage protections, and formal bans on



child labour, which are reflected in Chinese mining companies' ESG disclosures and domestic regulatory compliance frameworks (ILO, 2022). On the other hand, its continued non-ratification of ILO Core Conventions of freedom of association (C87) and collective bargaining (C98) creates a structural gap that also affects ESG performance, limiting independent worker representation, genuine collective bargaining, and effective grievance mechanisms (Donn & Zhao, 2016). Furthermore, there are gaps in requirements to manage risks related to ASM and human rights.

Regarding gaps in the environment pillar, Chinese standards do not offer specific requirements for conducting supply chain due diligence on waste materials, nor do they require tailings management in accordance with the Global Industry Standards on Tailings Management.

5.3.3 Overall Findings of Benchmark Exercise

The benchmark exercise shows a high degree of topical alignment of the Chinese GSRM and GDDM with IRMA 2.0 and RRA 3.0. While this alignment underscores the high degree of Chinese learning and adaptation to existing international guidelines at the level of standards development, as explained in the methodology, alignment does not guarantee the same level of quality in terms of rigour and accountability. Alignment is not to be interpreted as a measure to *equalize* standards being compared. Still, the analysis helps identify thematic gaps where the Chinese standards do not contemplate specific requirements (“non-aligned”) or where they are substantially different in the requirement details (“partially aligned”).

In terms of **environmental responsibility**, the GSRM and the GDDM present gaps in certain important areas, such as water, soil, waste material, and tailings management. This means that a Chinese company operating overseas and only implementing the GSRM and the GDDM will fall short of the environmental protection requirements covered by IRMA 2.0 and RRA 3.0.

In terms of **social responsibility**, the selected international standards have a stronger focus and higher expectations on various key social issues compared to the GSRM and the GDDM, including in relation to engagement with Indigenous Peoples, FPIC, land acquisition, displacement, and resettlement, as well as workers' rights, OHS, non-discrimination guidance, and inclusion of under-represented groups. There are also gaps in specific requirements for managing social risks related to ASM and human rights.

Furthermore, IRMA 2.0 provides a more comprehensive coverage of community engagement, including standards on community health and safety management, internal and external complaint mechanisms, and project localization management. IRMA 2.0 also has the reach to apply social requirements to the upstream supply chain through requirements for due diligence audits on suppliers. These features are not found in the two Chinese VSSs.

Finally, it appears there are no major gaps in the coverage of themes and requirements for **corporate governance**, although a more in-depth analysis beyond the scope of this benchmark exercise would be required to assess the quality of transparency and accountability the Chinese standards can afford, given their governance management, including the composition of their governance structures and processes (e.g., independent, third-party audits).



6.0 Chinese Nickel Processors in Indonesia

To complement the comparative VSS benchmark analysis presented in Section 4, interviews with Chinese, Indonesian, and other international stakeholders were conducted to gain more specific insights into the current state of ESG practices and compliance by Chinese companies, with a particular focus on companies operating overseas (see Appendix A). This review allows a comparison of the ESG-related regulatory frameworks and practices of Chinese companies operating domestically and abroad. More specifically, one case study was selected: Chinese-owned nickel processors in Indonesia. Indonesia was selected as it is a major global producer of nickel, and there is significant Chinese investment present in the country.

Indonesia's minerals sector is characterized by abundant reserves of nickel, coal, bauxite, tin, and copper (IGF, 2026; Zahara & Mussry, 2025). Indonesia has adopted industrial policies to increase its share in value addition in the nickel value chain and accelerate economic growth. These policies include export bans on unprocessed ores, incentives for downstream processing, and state support for the construction of nickel smelters (Setiani et al., 2024).

Chinese companies control an estimated 75% of Indonesia's nickel refining capacity, achieving this dominance through large-scale investments, notably by Tsingshan Holding Group and Jiangsu Delong Nickel Industry (Center for Advanced Defense Studies, 2025; Reuters, 2025). Extensive Chinese joint ventures and technology transfers have cemented Indonesia's central role in electric vehicle and stainless-steel value chains globally, driven by Chinese finance and operational expertise (Center for Advanced Defense Studies, 2025; Singgih, 2024).

6.1 The ESG Regulatory Environment in Indonesia

The main regulations in Indonesia with environmental and social dimensions applicable to nickel mines and processors include the following:

- Law No. 32 of 2009 on Environmental Protection and Management (as amended by Law No. 6 of 2023) establishes the fundamental framework for EIAs (known in Indonesia as *Analisis Mengenai Dampak Lingkungan* [AMDAL]). The procedures have been further updated under Government Regulation No. 22 of 2021 on the Implementation of Environmental Protection and Management, which requires certain industries to report to the Continuous Industrial Emissions Information System (SISPEK).³⁵
- Ministry of Energy and Mineral Resources Regulation No. 26 of 2018 on the Implementation of Good Mining Practices and Supervision of Mineral and Coal

³⁵ Companies, who are required to submit reports on pollutant emissions, have been asked to join the Continuous Emission Monitoring System since 2021 and connect the data to the SISPEK, operated by the government since 2023, with the aim of shifting from reactive penalty to proactive prevention. The Indonesian Ministry of Environment and Forestry Regulation No. 13 of 2021 on Continuous Emission Monitoring System for Industrial Emissions was enacted and came into effect on May 24, 2021. This regulation requires several industries, including mining and iron and steel processing, to install the Continuous Emission Monitoring and connect the data to the SISPEK operated by the government before January 1, 2023.



Mining mandates the implementation of good mining practices, encompassing environmental management, OHS standards, and mining supervision.

- Law No. 3 of 2020 (The Mining Law Amendment) amends the 2009 Mining Law to strengthen the legal framework for mineral and coal mining, specifically mandating the execution of Community Development and Empowerment Programs as a core social responsibility for mining companies.
- Ministry of Environment and Forestry³⁶ Regulation No. 1 of 2021 on the environmental management performance rating program, Program Penilaian Peringkat Kinerja Perusahaan dalam Pengelolaan Lingkungan Hidup (PROPER; the Company Environmental Performance Rating Program).³⁷
- Ministry of Environment and Forestry Regulation No. 4 of 2014 concerning Emission Quality Standards for Non-Moving Sources for Mining Businesses and/or Activities, with specific parameters for pyrometallurgy.³⁸

Moreover, the National Action Plan on Business and Human Rights, initially developed by the National Human Rights Commission of Indonesia (Komnas HAM) in 2017, was institutionalized via Presidential Regulation No. 60 of 2023 on the National Strategy for Business and Human Rights 2023–2025. This regulation provides a legal framework for companies to conduct human rights due diligence and establishes state-led mechanisms for monitoring and remedies. While the Ministry of Law and Human Rights is responsible for its implementation, interviewed stakeholders note that the regulation currently operates on a voluntary basis with limited enforcement oversight (Appendix A, interview 22).

According to industry experts interviewed, the low enforcement capacity of existing Indonesian environmental protection requirements is a pervasive challenge (Appendix A, interviews 22, 23). Respondents also noted that the Indonesian Ministry of Environment and Forestry, which has supervision and sanctioning power in environmental management, has limited enforcement capacity.

An unusual feature of the Indonesian governance framework regarding tailings is that those with high acid content or deemed toxic (i.e., tailings from HPAL nickel processing) are classified as hazardous waste and are under the jurisdiction of the Ministry of Environment, rather than under the line ministry responsible for mining (i.e., the Ministry of Energy and Mineral Resources). This structure may create regulatory disconnects in the absence of

³⁶ In 2024, the Ministry of Environment and Forestry was restructured and split into two separate line ministries: the Ministry of Environment and Ministry of Forestry by Presidential Regulations 175, 182 of 2024. In addition, Presidential Regulation 183 of 2024 established the Environmental Control Agency (BPLH).

³⁷ PROPER evaluates companies' environmental management through stages: planning, implementation, and ranking. It assesses compliance in pollution control, waste management, and social responsibility, assigning color-coded ratings: Gold (excellent innovation), Green (beyond compliance), Blue (compliant), Red (non-compliant), and Black (polluting). The program promotes transparency, encourages sustainable practices, and fosters an eco-friendly business ecosystem across industries.

³⁸ Regulation No. 4/2024 sets binding emission standards for nickel ore processing using pyrometallurgical technology, covering nickel matte, reduction kilns, dryers, electric furnaces, and product dryers. It specifies maximum concentrations for particulate matter, nitrogen oxides, sulfur dioxide (including as kg SO₂ per kg Ni for nickel matte), metals and opacity, measured at standard conditions with oxygen correction, and requires regular monitoring and compliance for both existing and new smelter facilities.



close interministerial coordination, including for enforcement (Appendix A, interview 20). Furthermore, seabed tailings disposal is not banned in Indonesia, despite being a controversial practice. An open-ended moratorium on new permits has been in effect since 2021, but it is unclear if they will be issued again in the future (Appendix A, interview 23). Technically, the regulation still gives discretion to the Ministry of Environment and the Ministry of Marine Affairs and Fisheries to issue new permits.³⁹

Enforcement of environmental laws can be further complicated in mining projects designated as National Strategic Projects (PSNs).⁴⁰ There is a lack of public participation in the PSN designation process, and once a project receives that status, it is given facilitation priority to be fast-tracked, including when it comes to land acquisition and compensation, making these projects more prone to community conflict and litigation.⁴¹ While there are ongoing environmental cases, the courts have yet to rule in favour of a major case to uphold environmental protection rights. By contrast, lawsuits against environmental defenders and activists are on the rise, possibly as an intimidation tactic (Appendix A, interview 23; Jong, 2018).

Indonesia's AMDAL (ESIA) does formally integrate social dimensions, including land acquisition, community compensation, and Indigenous Peoples' rights (Appendix A, interview 19, 20). The AMDAL reform under Government Regulation No. 22/2021 introduced structured public participation, documentation requirements, and mandatory consultation procedures, aspects that interviewees generally did not associate with Chinese EIAs (Appendix A, interview 19).

Another key regulatory issue interviewees mentioned is that the Indonesian Ministry of Industry, which is responsible for ensuring safety in industrial plants, including in mining processing facilities, lacks effective inspection protocols or standards in incident and safety management (Appendix A, interview 24). Interviewees also pointed out significant accidents in the mining and mineral processing industries in Indonesia in recent years, some of which were fatal.⁴²

³⁹ Government Regulation No. 22 of 2021 (PP 22/2021) still contains provisions that allow for the "ocean dumping" of hazardous waste (including tailings) under extremely strict technical and environmental conditions. However, the government has exercised its administrative authority to stop granting new permits for this practice.

⁴⁰ Presidential Regulation Number 3 of 2016 concerning the Acceleration of Implementation of National Strategic Projects defines PSN as government or private projects with strategic importance for growth and regional equity, lists eligible projects, and mandates accelerated and coordinated licensing by ministries and local governments under the coordination of the Coordinating Minister for Economic Affairs.

⁴¹ Government Regulation Number 42 of 2021 concerning the Ease of National Strategic Projects details concrete "facilitation measures" for PSN across planning, preparation, transaction, construction, and operation stages, including simplified permits, land acquisition support, procurement flexibility, social impact management, dispute resolution, and structured reporting on PSN progress.

⁴² For example, the explosion of the smelter furnace at the Indonesia Morowali Industrial Park in Sulawesi killed 13 and injured 46 workers in December 2023 (Reuters, 2023).



6.2 Progress and Gaps in ESG Practices: Chinese nickel processors operating in Indonesia

Chinese companies are increasingly disclosing their ESG practices in Indonesia through public ESG reports in recent years.⁴³ However, only Chinese nickel processors whose products are exported to European and American markets are voluntarily submitting to external independent audits to meet supply chain due diligence compliance requirements. For example, a few Chinese-owned nickel refiners have already passed the RMI ESG audit (Appendix A, interview 19). Thus, the overall perception of interviewed stakeholders is that the ESG management of Chinese nickel processors in Indonesia is at an initial stage and is responsive primarily to market access considerations (Appendix A, interviews 18, 19, 22).

Stakeholders interviewed noted that, with the introduction of the EU's new Battery Regulation (Regulation 2023/1542), there is closer attention and stronger demand from European downstream automakers on ESG management of battery material processors, and that this is influencing ESG practices in the supply chain. Chinese nickel processors — especially those processing battery-grade nickel materials (Class 1)—are affected by these regulatory changes and are gradually enhancing their ESG management practices (Appendix A, interview 21). Respondents have noted that some Chinese companies have strengthened their systematic coordination and capacity building for overseas nickel processors in terms of ESG management and have set up special teams at Indonesian project sites to carry out supply chain due diligence and ESG management (Appendix A, interview 21). By contrast, Chinese companies that are processing nickel products in Indonesia with China as their destination market (e.g., nickel products for steel production destined for the Chinese domestic market) are not under the same pressure to enhance their ESG management practices (Appendix A, interview 18).

The following is a summary of key findings on the progress and gaps of ESG practices of Chinese nickel processors in Indonesia based on stakeholder interviews and publicly available ESG disclosure reports.⁴⁴

- **Environmental protection (waste management):** Some companies interviewed reported that they follow the principle of “adopting the higher standard” when it comes to environmental protection, opting to follow “stricter” Chinese standards over Indonesian ones (Appendix A, interview 1). To meet the requirements of financing institutions, some Chinese companies will follow International Finance Corporation performance standards or other international standards in addition to complying with Indonesian environmental regulations (Appendix A, interview 2). Interviewees pointed out that local stakeholders are increasingly demanding greater transparency and accountability for enterprises’ environmental indicators, particularly regarding water, soil, and air pollution, as well as the impact of nickel processing on community

⁴³ Chinese companies and joint ventures with Chinese participation that have published sustainability or ESG reports on their operations in Indonesia in the last six years include: Huayuo, QMB, IMP and IWIP.

⁴⁴ Reports referenced include *Huayuo 2024 Sustainability Report*, *2021 ESG Report of Huayuo Nickel Cobalt (Huayuo)*, *CNGR 2024 Sustainability Report*, *GEM 2024 Sustainability Report*, and *2023 ESG Report of QMB New Energy Materials (QMB)*, etc.



health (Appendix A, interviews 22, 23, 24). Subsidiaries of Chinese companies, such as PT Huayue Nickel Cobalt, PT QMB New Energy Materials, PT Indonesia Morowali Industrial Park, and PT Indonesia Tsingshan Stainless Steel, have received a Blue-rated PROPER⁴⁵ certificate from the Indonesian Ministry of Environment, indicating basic compliance with Indonesian environmental regulations (Ministry of Environment and Environmental Control Agency of the Republic of Indonesia, 2025).

- **GHG emissions:** Some Chinese nickel processors have established digital monitoring platforms for environmental protection and safe production in their factories linked to GHG emissions (i.e., Continuous Emission Monitoring Systems) and connected emission sources to the Indonesian government's online monitoring system, SISPEK (Appendix A, interview 1; PT Halmahera, 2023; Tempo, 2025). However, GHG emissions-related data at the Indonesian project level have not yet been fully disclosed to the public.
- **Tailings management:** Chinese nickel processors have made institutional improvements and technological investments to enhance their tailings management capabilities (Appendix A, interview 1).⁴⁶ Nevertheless, accidents have occurred in recent years in rain-prone and seismic zones, indicating that current efforts have not yet fully mitigated structural risks.⁴⁷ Local stakeholders expect companies to improve transparency in tailings management, provide compensation to affected communities, and invest more in advanced waste treatment technologies to prevent safety risks (Appendix A, interviews 22, 23).
- **OHS:** In recent years, accidents involving some nickel processors in Indonesia have prompted more companies to strengthen their OHS management. In response, some Chinese companies have reported adopting safety management systems aligned with Indonesia's SMK3 Occupational Health and Safety Management System and the ISO 45001 Occupational Health and Safety Management System. Chinese companies that have obtained ISO's 45001 and SMK3 certification collaborate with third-party professional institutions to conduct regular OHS testing and risk assessments (Appendix A, interview 4). Furthermore, two Chinese nickel refiners, PT Indonesia Tsingshan Stainless Steel and QMB, have successively introduced the ILO's Sustaining Competitive and Responsible Enterprises (SCORE) program,

⁴⁵ PROPER is a national-level enterprise environmental performance evaluation system led by the Indonesian government. It includes 12 assessment indicators: compliance with wastewater discharge standards, hazardous and general waste management, water pollution control systems, air pollution control systems, marine pollution prevention, noise control, energy-saving measures, greening projects, ISO 14001 certification, implementation of corporate social responsibility projects, execution of eco-efficiency policies, and commitment from senior management. The assessment uses a five-tier colour rating system (ranging from black to gold) to annually evaluate and publicly announce companies' environmental compliance and sustainable development performance.

⁴⁶ These include formulating tailings management policies and procedures, establishing emergency response mechanisms; adopting advanced, more environmentally friendly and safe tailings disposal solutions such as dry stacking technology for tailings and waterproof covering measures; controlling the discharge of tailings wastewater, waste gas, and solid waste to meet Indonesia's standards; strengthening the treatment and reuse of tailings wastewater to improve water resource utilization efficiency; and carrying out comprehensive utilization of tailings and ecological restoration.

⁴⁷ For example, in March 2025, a fatal tailings dam failure occurred in the Indonesia Morowali Industrial Park (Jong, 2025).



which promotes respect for workers' rights through a "full participation, bottom-up" approach (Appendix A, interview 4). Government stakeholders interviewed reported that OHS remains a concern in the nickel processing industry (Appendix A, interview 24).

- **Community engagement:** Stakeholders interviewed recognized that community communication and relationship management remain weak areas for Chinese nickel processors in Indonesia (Appendix A, interviews 4, 21, 22, 23, 24). They highlighted that there is a lack of communication and trust between Chinese companies and local communities and that local communities perceive corporate grievance mechanisms meant to address these issues as opaque and untrustworthy (Appendix A, interviews 22, 23, 24, 25). These challenges are not faced only by Chinese nickel processors; however, in China, companies tend to rely more on local governments to coordinate engagement with the local communities, while in Indonesia local governments are not as involved in these matters. This might help explain why it is a particular challenge for Chinese companies (Appendix A, interviews 4, 22, 25).
- **Indigenous Peoples.** Stakeholders interviewed stated that Chinese nickel miners and processors are not meeting the expectations of local stakeholders, nor those of the international community, when it comes to their engagement with Indigenous Peoples (Appendix A, interviews 18, 19, 22, 23). A particular challenge in the Indonesian context is the lack of formal, legal recognition of some local communities affected by nickel mining, such as the O'Hongana Manyawa people in Halmahera (Survival International, n.d.). In practice, many self-identified Indigenous or forest-dependent communities are not formally recognized as Indigenous Peoples under Indonesian law,⁴⁸ leaving them in a legal vacuum when it comes to compensation, consultation, and consent procedures. One reason for this legal lacuna is the lack of a comprehensive framework to recognize Indigenous communities. The Indigenous Peoples Bill (RUU *Masyarakat Adat*) aims to address this by establishing a clear procedure for state recognition of Indigenous Peoples (identification, verification, ratification), but some interest groups fear it will jeopardize investment and it has yet to be approved by parliament at the time of this writing (Renaldi, 2025). For companies, these unrecognized but highly vulnerable communities create a profound dilemma: strictly speaking, they are not yet codified as rightsholders within the domestic legal framework; yet ignoring them triggers serious ESG, human rights, and reputational risks under international standards and markets. Stakeholders agree that joint efforts from the government, industry associations, civil society organizations, and other parties are needed to uphold Indigenous Peoples' rights and improve Chinese companies' relations with them (Appendix A, interviews 18, 19, 22, 23).

⁴⁸ The Ministry of Home Affairs Regulation No. 52/2014 provides operational Guidelines for the Recognition and Protection of Indigenous Peoples (*Masyarakat Hukum Adat*), assigning local governments clear responsibilities for identification, verification, and recognition through regional decrees. Presidential Regulation No. 186/2014, by contrast, brings Remote Indigenous Communities (*Komunitas Adat Terpencil*) into the social welfare framework, clarifying central and local government duties in terms of social empowerment and protection.



7.0 Findings on Overseas Chinese Companies' ESG Management Practices

This section summarizes key findings arising out of the analyses presented in sections 3, 4, and 5 above.

7.1 Characteristics and Gaps in ESG Management of Overseas Chinese Enterprises

The Chinese government does not have mandatory ESG management performance policies or regulations for Chinese companies operating in the minerals sector overseas, but rather provides guidelines. In recent years, the government has enacted policy guidelines that generally call for Chinese companies to respect local laws and regulations and follow either Chinese or internationally recognized ESG standards when they are absent in the host economy. These policy guidelines are complemented by voluntary industry standards such as the GSRM and GDDM.

When compared to ESG standards found in international VSSs, Chinese VSSs applicable to overseas companies continue to present relevant gaps. Generally speaking, Chinese standards are more aligned with the environmental than the social dimension of international VSSs. This reflects China's own national ESG policy framework, which has stricter requirements in environmental protection relative to social protection. But gaps are found in both areas. For example, tailings, water, and soil management are environmental issues that could be strengthened in Chinese VSSs that apply to overseas companies.

Social issues where Chinese standards demonstrate limited alignment with international VSSs include community engagement, treatment of Indigenous Peoples, and ASM. In China, local governments play a leading role in community engagement and act as intermediaries between companies and local communities. Moreover, the Chinese government is primarily responsible for land expropriation and resettlement of affected communities for large investment projects, such as mining. By contrast, when operating abroad, Chinese companies are expected to play a more proactive role in community engagement—an area where many face challenges, as such practices are not traditionally part of their corporate culture. In addition, Chinese miners and processors operating abroad often face context-specific social issues that they may be inexperienced with or which are not covered by Chinese national rules or VSSs, such as a prevalence of ASM producers and Indigenous Peoples with legally supported claims to land.

7.2 Challenges in ESG Management Practices of Chinese Nickel Processors in China and Indonesia

Mineral supply chain due diligence management assessments led by Chinese institutions lack sufficient international interoperability, and enterprises face the



problem of repeated audits. Although the Chinese guidelines compiled by the CCCMC have been recognized by the LME, for example, they have not been widely adopted by the international market and downstream manufacturers. Even when copper and nickel refiners have participated in and completed the assessment against the Chinese guidelines, some downstream enterprises still require them to conduct additional supply chain audits in accordance with the international standards they recommend, placing pressure on enterprises to undergo repeated audits and incurring increased costs.

Balancing the information transparency requirements of supply chain due diligence audits and companies' confidential information and data protection regulations is a significant challenge faced by Chinese processors. The interviewed companies operating in Indonesia shared that the mineral supply chain due diligence audit process requires companies to disclose sensitive information, such as supplier and material sources, production data, commercial contracts, processing technology, etc., which at times involves confidential business information (e.g., trade secrets, intellectual property). Some Chinese companies believe that these due diligence audit requirements may infringe on their information security. For example, in recent years, blockchain technology has been introduced for mineral supply chain traceability and audits, and audited companies are required to upload this data to international networks. Chinese companies are concerned that this practice may violate cross-border data transmission provisions in China's 2021 Data Security Law (Standing Committee of the National People's Congress, 2021). The Chinese government is developing data security standards that would classify and regulate data to bring further clarity to Chinese companies.

Downstream companies are transferring ESG risks to mineral processing companies rather than sharing responsibility in due diligence. Based on interviews and academic literature, downstream actors, such as automobile, electronics, and battery manufacturers, are prone to requiring suppliers to sign contractual clauses that transfer due diligence responsibilities to the suppliers and adopt "de-risking" or a disengagement strategy in case ESG risks materialize (Franken & Schütte, 2022). Interviewed stakeholders are of the opinion that this goes against OECD guidance, which recommends exhausting other mitigation options before disengaging (OECD, 2019), and that downstream companies could do more to share responsibility. For instance, they could exert their industry influence to provide constructive support and capacity building with their suppliers for formalized governance at the mining source.



8.0 Conclusion and Recommendations

Chinese authorities have taken steps to strengthen their national ESG framework as it relates to the mineral sector and to integrate national environmental standards with international ones to promote adoption by companies operating both in China and overseas. China has also actively advanced the internationalization of Chinese standards, which have begun to gain international recognition. A clear example is the alignment recognition of the CCCMC's Chinese guidelines by the LME. At the same time, China is gradually moving from a paradigm of providing guidance for voluntary ESG best practices to one of mandatory ESG disclosure and performance monitoring, starting with listed companies operating domestically.

However, Chinese ESG standards and practices are not fully aligned with international market expectations. Such alignment would enhance the ESG management of Chinese companies in line with a global minerals market that is increasingly demanding more transparency, traceability, and due diligence to ensure market access.

While they are no substitute for national legal and regulatory frameworks that govern the mining sector, adhering to ESG standards can contribute to better sustainability outcomes. Improving Chinese enterprises' global ESG capabilities and performance can help mitigate undesirable environmental and social impacts of the mining and mineral processing industries and strengthen engagement with local stakeholders in partner countries. With these objectives in mind, the following recommendations are proposed.

Recommendation 1.

Advance alignment of Chinese ESG standards in the mining sector with international standards and strengthen coordination with multistakeholders among mineral supply chains.

MOFCOM and MIIT could provide political and technical support to improve the CCCMC's and CNIA's ESG standards to accelerate the process of gaining recognition and adoption by domestic and international stakeholders, in line with the 15th Five-Year Plan adopted in March 2026. The CCCMC could further improve its standard and supporting assessment tools, as well as the governance system of the accompanying assessment program, to close the gap with international VSSs. In addition, MOFCOM and MIIT could support the CCCMC and CNIA in policy advocacy to guide upstream and downstream enterprises in avoiding overemphasizing superficial (i.e., "box-ticking") audits while being indifferent to the governance of supply chain source risks. They could also support Chinese standards bodies to coordinate with international VSS-setting bodies and supply chain enterprises.

Recommendation 2.

Develop financial incentives mechanisms for enterprises based on ESG performance.

The People's Bank of China and the NDRC could encourage Chinese financial institutions to incorporate corporate ESG performance as determinants of credit rating and approval (based on the *Guiding Opinions on Further Strengthening Financial Support for Green and Low-Carbon Development*, released in March 2024). This practice would give companies with



excellent ESG performance incentives by facilitating financing at favourable terms, such as lower interest rates or higher credit limits, and offering priority for approval of overseas direct investment projects.

Recommendation 3.

Establish bilateral technical cooperation and policy harmonization mechanisms on ESG in mineral supply chains.

MOFCOM, in collaboration with the CCCMC and Chinese embassies and Chinese chambers of commerce or associations in the host country, could establish a bilateral mechanism comprised of a technical working group. The working group would focus on policy dialogue and standard alignment in the host country's context (e.g., Indonesia). By facilitating joint consultations, the mechanism can develop tailored ESG roadmaps and technical guidance that reflect the mineral processing industry's actual operational landscape, ensuring that host country regulations are interoperable and globally competitive. The technical working group would be composed of government officials and authoritative technical experts from industrial associations and academia of both countries who would jointly conduct research and provide technical guidance to address prominent or potential ESG risks and issues in the host country's mineral regulatory framework and supply chains.

Recommendation 4.

Support ESG research and training centres in key mineral-rich source countries.

MOFCOM, SASAC, MEE, and other departments, along with Chinese embassies and Chinese chambers of commerce or associations in host countries, could support ESG research and training centres in key mineral-rich source countries, like Indonesia. The centres would provide targeted research and modular training on priority ESG topics. Partnership between the Chinese and the host country government, academia, and think tanks could be pursued to generate impartial research into technical ESG areas that could enhance the ESG management capabilities of regulatory authorities and companies across the supply chain. A pilot phase with a few selected ESG performance "best-in-class" mining projects could be considered to initiate research in this respect. In addition, based on the special training program Promoting Responsible Business Conduct in Overseas Investment launched by the China Foundation for Human Rights Development in 2025, it is recommended that the SASAC promote the participation of management and executive personnel from central SOEs, local SOEs, and relevant private enterprises that operate mining and processing facilities overseas in subsequent training sessions, possibly through these research and training centres.

Recommendation 5.

Clarify data security requirements for audit programs in mineral supply chain due diligence and ESG management.

MIIT, in collaboration with the Ministry of Natural Resources and the Standardization Administration of China, could conduct and publish an assessment on the data and materials required to be provided or transmitted cross-border by enterprises during mineral supply



chain due diligence management and ESG management audits. This assessment could be based on current regulations and guidelines such as the *Guidelines for the Construction of Data Security Standard System in the Industrial Sector* (2023 Edition), *Guidelines for Data Security Compliance in the Industrial and Information Technology Fields*, *Guidelines for Identification of Important Data in the Industrial Sector*, and the *Measures for Data Security Management in the Field of Natural Resources*. The assessment could provide clear guidance for domestic and overseas Chinese mineral supply chain enterprises, as well as external audit institutions, ensuring that the audit process, audit result records, and information transmission comply with Chinese legal requirements and prevent enterprises from facing compliance risks.



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Appendix A. List of Interviews

ID	Interviewee description	Date	Mode
1	Manager at a Chinese nickel smelter in Indonesia	May 2025	Virtual
2	Environmental, Social and Governance (ESG) officer at a Chinese globally operating nickel producer	May 2025	Virtual
3	ESG officer at a Chinese globally operating copper producer	May 2025	Virtual
4	ESG officer at a Chinese nickel producer and refiner	May 2025	In-person
5	Manager at a Chinese copper and cobalt miner and smelter	May 2025	Virtual
6	ESG officer at a Chinese copper and cobalt miner and smelter	May 2025	Virtual
7	Democratic Republic of the Congo government advisor on mining policy	May 2025	In-person
8	ESG officer at a Chinese copper miner and smelter	June 2025	Virtual
9	ESG officer at a Chinese-majority-owned international mining company	June 2025	Virtual
10	ESG officer at a Chinese-invested Congolese copper miner	May 2025	Virtual
11	Manager at a Chinese globally operating nickel and copper miner and refiner	May 2025	Virtual
12	ESG officer at a global copper smelter and trader	May 2025	Virtual
13	Mineral supply chain expert at a sustainability consultancy	May 2025	Virtual
14	Geologist, mining expert at an international organization	May 2025	Virtual
15	Democratic Republic of the Congo-based civil society mining expert	May 2025	Virtual
16	Program officer, Responsible Minerals Initiative	May 2025	Virtual
17	Indonesia-based energy and ESG expert	June 2025	In-person
18	Indonesia-based mining expert	June 2025	In-person
19	Indonesian mining industry association	June 2025	In-person
20	Jakarta-based legal consultant in mining	June 2025	In-person
21	Manager at an Indonesian nickel industrial park	June 2025	In-person



ID	Interviewee description	Date	Mode
22	Indonesia-based civil society expert	June 2025	In-person
23	Indonesia-based mining and environment expert	June 2025	In-person
24	Indonesian government agency official	June 2025	In-person
25	Indonesia-based international sustainability expert	July 2025	Virtual



Appendix B. National and Sector Standards Related to ESG in Mineral Value Chains

Type	Name of the standard	Competent department	Execution time
National Standard			
推荐性 Recommended	GB/T 36000-2015社会责任指南 GB/T 36000-2015 Guidance on social responsibility	家市场监管总局 State Administration for Market Regulation	2016
推荐性 Recommended	GB/T 39604-2020社会责任管理体系要求及使用指南 GB/T 39604-2020 Social responsibility management systems – Requirements with guidance for use	国家市场监管总局 State Administration for Market Regulation	2020
推荐性 Recommended	GB/T 45001-2020职业健康安全管理体系 要求及使用指南 GB/T 45001-2020 Occupational health and safety management systems – Requirements with guidance for use	国家市场监管总局 State Administration for Market Regulation	2020
推荐性 Recommended	GB/T 26317-2010 公司治理风险管理指南 GB/T 26317-2010 Guidelines for corporate governance risk management	国家标准化管理委员会 National Standardization Administration	2011
推荐性 Recommended	GB/T 35770-2022合规管理体系 要求及使用指南 GB/T 35770-2022 Compliance management systems – Requirements with guidance for use	国家市场监管总局 State Administration for Market Regulation	2022
推荐性 Recommended	GB/T 24001-2016 环境管理体系 要求及使用指南 GB/T 24001-2016 Environmental management systems – Requirements with guidance for use	国家标准化管理委员会 National Standardization Administration	2017



Type	Name of the standard	Competent department	Execution time
推荐性 Recommended	GB/T 29456-2012能源管理体系 实施指南 GB/T 29456-2012 Energy management systems – Implementation guidance	国家标准化管理委员会 National Standardization Administration	2013（修订中） (under revision)
推荐性 Recommended	GB/T 32150-2015工业企业温室气体排放核算和报告通则 GB/T 32150-2015 General guideline of the greenhouse gas emissions accounting and reporting for industrial enterprises	国家发展改革委 National Development and Reform Commission	2016
推荐性 Recommended	GB/T 33635-2017绿色制造 制造企业绿色供应链管理 导则 GB/T 33635-2017 Green manufacturing – Green supply chain management in manufacturing enterprises – Guideline	国家标准化管理委员会 National Standardization Administration	2017
强制性 Mandatory	GB 25467-2010铜、镍、钴工业污染物排放标准 GB 25467-2010 Emission standard of pollutants for copper, nickel, cobalt industry	生态环境部 Ministry of Ecology and Environment	2010
强制性 Mandatory	GB 16297-1996大气污染物综合排放标准 GB 16297-1996 Integrated emission standard of air pollutants	生态环境部 Ministry of Ecology and Environment	1997（修订中） (under revision)
强制性 Mandatory	GB 14554-1993 恶臭污染物排放标准 GB 14554-1993 Emission standards for odour pollutants	生态环境部 Ministry of Ecology and Environment	1994（修订中） (under revision)
强制性 Mandatory	GB 8978-1996 污水综合排放标准 GB 8978-1996 Integrated wastewater discharge standard	生态环境部 Ministry of Ecology and Environment	1998（修订中） (under revision)
强制性 Mandatory	GB 31573-2015无机化学工业污染物排放标准 GB 31573-2015 Emission standards of pollutants for inorganic chemical industry	生态环境部 Ministry of Ecology and Environment	2015



Type	Name of the standard	Competent department	Execution time
强制性 Mandatory	GB 15618-2018 土壤环境质量 农用地土壤污染风险管控标准（试行） Soil environment quality-risk control standard for soil contamination of agriculture land (Trial)	生态环境部 Ministry of Ecology and Environment	2018
强制性 Mandatory	GB 36600-2018 土壤环境质量 建设用地土壤污染风险管控标准（试行） Soil environment quality risk control standard for soil contamination of development land (Trial)	生态环境部 Ministry of Ecology and Environment	2018
强制性 Mandatory	GB 3096-2008 声环境质量标准 GB 3096-2008 Environmental quality standards for noise	生态环境部 Ministry of Ecology and Environment	2008
强制性 Mandatory	GB 12348-2008 工业企业厂界环境噪声排放标准 GB 12348-2008 Emission standard for industrial enterprises noise at boundary	生态环境部 Ministry of Ecology and Environment	2008
强制性 Mandatory	GB 3838-2002 地表水环境质量标准 GB 3838-2002 Environmental quality standards for surface water	生态环境部 Ministry of Ecology and Environment	2002（修订中） (under revision)
推荐性 Recommended	GB/T14848-2017 地下水质量标准 GB/T14848-2017 Standard for groundwater quality	自然资源部 Ministry of Natural Resources	2018（修订中） (under revision)
强制性 Mandatory	GB 9078-1996 工业炉窑大气污染物排放标准 GB 9078-1996 Emission standard of air pollutants for industrial kiln and furnace	生态环境部 Ministry of Ecology and Environment	1997
强制性 Mandatory	GB 3095-2012 环境空气质量标准 GB 3095-2012 Ambient air quality standard	生态环境部 Ministry of Ecology and Environment	2018
强制性 Mandatory	GB 18599-2020 一般工业固体废物贮存和填埋污染控制标准 GB 18599-2020 Standard for pollution control on the non-hazardous industrial solid waste storage and landfill	生态环境部 Ministry of Ecology and Environment	2021



Type	Name of the standard	Competent department	Execution time
强制性 Mandatory	GB 18597-2023 危险废物贮存污染控制标准 GB 18597-2023 Standard for pollution control on hazardous waste storage	生态环境部 Ministry of Ecology and Environment	2023
强制性 Mandatory	GB 5085.3-2007 危险废物鉴别标准-浸出毒性鉴别 GB 5085.3-2007 Identification standards for hazardous wastes – Identification for extraction toxicity	生态环境部 Ministry of Ecology and Environment	2007
强制性 Mandatory	GB 39496-2020 尾矿库安全规程 GB 39496-2020 Safety regulation for tailings pond	国家矿山安监局 National Mine Safety Administration	2021
推荐性 Recommended	GB/T 32151.42-2024 温室气体排放核算与报告要求 第42部分 铜冶炼企业 GB/T 32151.42-2024 Requirements of the greenhouse gas emissions accounting and reporting – Part 42: Copper smelting enterprise	中国有色金属工业协会 China Non-ferrous Metals Industry Association	2025
推荐性 Recommended	GB/T 44823-2024 绿色矿山评价通则 General principles for assessment of green mine	自然资源部 Ministry of Natural Resources	2025
Sector standard			
强制性 Mandatory	HJ 934-2017 排污许可证申请与核发技术规范 有色金属工业-镍冶炼 HJ 934-2017 Technical specification for application and issuance of pollutant permit non-ferrous metal metallurgy industry-nickel smelting	生态环境部 Ministry of Ecology and Environment	2017
强制性 Mandatory	HJ 863.3-2017 排污许可证申请与核发技术规范 有色金属工业-铜冶炼 HJ 863.3-2017 Technical specification for application and issuance of pollutant permit non-ferrous metal metallurgy industry-copper smelting	生态环境部 Ministry of Ecology and Environment	2017



Type	Name of the standard	Competent department	Execution time
强制性 Mandatory	HJ 558-2010清洁生产标准 铜冶炼业 HJ 558-2010 Cleaner production standard Copper smelting industry	生态环境部 Ministry of Ecology and Environment	2010
强制性 Mandatory	HJ 298-2019 危险废物鉴别技术规范 HJ 298-2019 Technical specifications on identification for hazardous waste	生态环境部 Ministry of Ecology and Environment	2020
强制性 Mandatory	HJ 1276-2022 危险废物识别标志设置技术规范 HJ 1276-2022 Technical specification for setting identification signs of hazardous waste	生态环境部 Ministry of Ecology and Environment	2023
推荐性 Recommended	HJ 2059-2018 铜冶炼废水治理工程技术规范 HJ 2059-2018 Technical specification for wastewater treatment of copper smelting	生态环境部 Ministry of Ecology and Environment	2019
推荐性 Recommended	HJ 2060-2018铜冶炼废气治理工程技术规范 HJ 2060-2018 Technical specifications for waste gas control of copper smelting	生态环境部 Ministry of Ecology and Environment	2019
推荐性 Recommended	YS/T 1429-2021 镍冶炼行业绿色工厂评价要求 YS/T 1429-2021 Evaluating requirements for green factory in nickel smelting industry	工业和信息化部 Ministry of Industry and Information Technology	2021
推荐性 Recommended	YS/T 1407-2021 铜冶炼行业绿色工厂评价要求 YS/T 1407-2021 Evaluating requirements for green factory in copper smelting	工业和信息化部 Ministry of Industry and Information Technology	2021
强制性 Mandatory	HJ651-2013 矿山生态环境保护与恢复治理技术规范（试行） HJ651-2013 Technical specifications of eco-environmental protection and reclamation for mining (Trial)	生态环境部 Ministry of Ecology and Environment	2013



Type	Name of the standard	Competent department	Execution time
强制性 Mandatory	HJ 652—2013 矿山生态环境保护与恢复治理方案（规划）编制规范（试行） HJ 652—2013 Compiling guideline of eco-environmental protection and reclamation plan for mining (Trial)	生态环境部 Ministry of Ecology and Environment	2013
推荐性 Recommended	DZ/T0223-2011 矿山地质环境保护与恢复治理方案编制规范 DZ/T0223-2011 Compiling code on the project of mining geo-environmental protection and integrated renovation	自然资源部 Ministry of Natural Resources	2011
推荐性 Recommended	DZ/T 0287—2015 矿山地质环境监测技术规程 DZ/T 0287—2015 Technical regulation for mining geo-environment monitoring	自然资源部 Ministry of Natural Resources	2015
推荐性 Recommended	TD/T1031.1-2011 土地复垦方案编制规程第一部分：通则 TD/T1031.1-2011 Regulation on compiling land reclamation plan – Part 1: General rules	自然资源部 Ministry of Natural Resources	2011
推荐性 Recommended	TD/T1031.4-2011 土地复垦方案编制规程第四部分：金属矿 TD/T1031.4-2011 Regulation on Compiling Land Reclamation Plan – Part4: Metal Mine	自然资源部 Ministry of Natural Resources	2011
推荐性 Recommended	TD/T1036-2013 土地复垦质量控制标准 TD/T1036-2013 Completion standards on land reclamation quality	自然资源部 Ministry of Natural Resources	2013
推荐性 Recommended	DZ/T 0320-2018 有色金属行业绿色矿山建设规范 DZ/T 0320-2018 Green mine construction specification of non-ferrous metal industry	自然资源部 Ministry of Natural Resources	2018



Appendix C. Overview of the Initiative for Responsible Mining Assurance Draft Standard for Responsible Mining and Mineral Processing 2.0

Initiative for Responsible Mining Assurance (IRMA) DRAFT Standard for Responsible Mining and Mineral Processing 2.0

Owner	IRMA
Publication of the first standard version	<i>IRMA Standard for Responsible Mining</i> Version 1.0 released in 2018
Current standard version	IRMA DRAFT <i>Standard for Responsible Mining and Minerals Processing 2.0</i> released in 2023 (not the final version, which is being released for public consultation, not yet implemented)
Objective	The standard aims at becoming the best-practice sustainability standard for mineral exploration, extraction, and processing, serving as the basis for a comprehensive system that is intended to create transparency for mining's impacts and improve practices across supply chains through independent verification.
Target commodities	All mineral commodities, except for oil and gas, thermal coal, and uranium
Application scope	Mine site: all types of industrial or large-scale mining (including surface, sub-surface, and solution mining) Mining-related activities: • Exploration and development: mineral exploration and development, prior to the operational phase of a mine. • Extraction: mining and related activities, such as construction of infrastructure or beneficiation that occur on the mine site, and includes requirements that pertain to different phases of the mining life cycle through post-closure activities. • Processing: mineral processing operations at the mine site or beyond the mine gate, such as smelters, refineries, and other operations involved in the processing, separating, and purifying minerals and metals derived from ores and concentrates
Geographic focus	Global



Owner	IRMA
Sustainability scope	Business Integrity 1. Legal Compliance 2. Community and Stakeholder Engagement 3. Human Rights Due Diligence 4. Gender Equality & Gender Protections 5. Complaints and Grievance Mechanism and Access to Remedy 6. Financial Transparency and Anti-Corruption 7. Mineral Supply Chain and Responsible Sourcing Planning for Positive Legacies 8. Environmental and Social Impact Assessment and Management 9. Indigenous Peoples and Free, Prior, and Informed Consent 10. Obtaining Community Support and Delivering Benefits 11. Land Acquisition, Displacement, and Resettlement 12. Community Emergency Preparedness and Response 13. Planning and Financing Reclamation and Closure Social Responsibility 14. Fair Labour and Terms of Work 15. Occupational Health and Safety 16. Community Health and Safety 17. Conflict-Affected and High-Risk Area Due Diligence 18. Security Arrangements 19. Artisanal and Small-Scale Mining 20. Cultural Heritage Environmental Responsibility 21. Waste and Materials Management 22. Water Management 23. Management of Physical Stability 24. Air Quality 25. Noise and Vibration 26. Greenhouse Gas Emissions and Energy Consumption 27. Biodiversity, Ecosystem Services and Protected Areas 28. Land and Soil Management
Verification requirement	Independent third party
Verification frequency	Every 3 years
Public assessment reporting	Full
State of implementation	Assessment implementation begins in 2019. As of February 2025, 100 companies and 122 mines from 35 countries and regions have participated in the IRMA assessment system, with 10 mines obtaining certification.



Appendix D. Overview of the Responsible Minerals Initiative and The Copper Mark's Risk Readiness Assessment Criteria Guide v3.0

The Responsible Minerals Initiative and The Copper Mark Risk Readiness Assessment (RRA) Criteria Guide v3.0

Owner	IRMA
Owner(s)	Responsible Minerals Initiative (RMI) and The Copper Mark RRA Criteria is a tool of the RMI. RMI collaborated with The Copper Mark to revise RRA Criteria Guide. The RRA Criteria Guide v3.0 is a joint publication of the RMI and The Copper Mark.
Publication of the first standard version	<i>The Risk Readiness Assessment Criteria Guide</i> v1.0, released in 2017
Current standard version	<i>The Risk Readiness Assessment Criteria Guide</i> v3.0, released in 2023, effective in 2024
Objective	The standard aims to promote a common understanding of due diligence practices and a means to consistently assess environmental, social and governance (ESG) risks in mineral supply chains, which can be used as a self-assessment or for which conformance can be assessed by an independent third party.
Target commodities	Copper, molybdenum, nickel, and zinc
Application scope	Minerals and metals production: from mine, through metal processors (e.g., smelters and refiners) to downstream companies (e.g., fabricators, manufacturers, recyclers)
Geographic focus	Global
Sustainability scope	Governance 1. Management System 2. Risk Assessment 3. Business Integrity 4. Revenue Transparency 5. Legal Compliance 6. Sustainability Reporting 7. Grievance Mechanism 8. Stakeholder Engagement 9. Mine Closure & Reclamation 10. Responsible Supply Chains



Owner	IRMA
	Social 11. No Child Labour 12. No Forced Labour 13. Freedom of Association and Collective Bargaining 14. Non-Discrimination and Harassment 15. Diversity, Equity and Inclusion 16. Employment Terms 17. Occupational Health & Safety 18. Emergency Preparedness 19. Community Health & Safety 20. Community Development 21. Artisanal & Small-Scale Mining 22. Security & Human Rights 23. Indigenous Peoples' Rights 24. Land Acquisition & Resettlement 25. Cultural Heritage Environment 26. Climate Action 27. Greenhouse Gas Emissions' Reductions 28. Water Stewardship 29. Waste Management 30. Circular Economy 31. Tailings Management 32. Biodiversity and Productive Land 33. Pollution
Verification requirement	Independent third party
Verification frequency	Every 3 years
Public audit reporting	Partial
State of implementation	Assessment implementation begins in 2020. By the end of 2024, 111 sites were participating in the assurance program, 77 sites have obtained The Copper Mark, and seven sites have obtained The Nickel Mark. In 2024, 16 sites completed the assurance process and received The Copper Mark and two sites were awarded The Nickel Mark.



Appendix E. Benchmark Analysis With Main Gaps in Chinese ESG Standards Compared to IRMA 2.0

IRMA 2.0 principle	IRMA 2.0 chapter name	Non-aligned criteria	IRMA 2.0 requirement no.	Rationale for non-alignment score
2. Planning for Positive Legacies	2.2 Indigenous Peoples and Free, Prior and Informed Consent (FPIC)	Identification of and Engagement with Indigenous Peoples	2.2.3.1	Chinese standards do not contain a specific approach to identify Indigenous Peoples.
		Processes for Reaching Agreements on Past Impacts and Seeking FPIC for Proposed Activities	2.2.4.4	Chinese standards do not clarify how to support Indigenous Peoples during a remediation or FPIC process.
			2.2.4.7	Chinese standards do not contain specific requirements on public reports to be agreed by Indigenous Peoples.
	2.4 A - Proposed Historical Land Acquisition, Displacement, and Resettlement	Community Engagement	2.4A.3.2	Chinese standards do not contain requirements on the provision of active and explicit access to independent legal or other expert advice with affected people and communities.
		Specific Measures Related to Economic Displacement	2.4A.6.1	Chinese standards do not propose the specific requirements on the compensation measures that should be taken by the companies if project- or operation-related land acquisition or restrictions on land use result in economic displacement regardless of whether the affected people are physically displaced.



IRMA 2.0 principle	IRMA 2.0 chapter name	Non-aligned criteria	IRMA 2.0 requirement no.	Rationale for non-alignment score
			2.4A.6.2	Chinese standards do not propose specific measures for the companies to implement the compensation measures if project- or operation-related land acquisition or restrictions on land use result in economic displacement in the form of acquisition of lands on which affected people engage in productive activities or possess productive assets.
		Resettlement and Livelihood Restoration Agreements and Implementation	2.4A.7.6	Chinese standards do not cover the specific requirements on the procedure before companies could take possession of acquired land and related assets.
			2.4A.7.7	Chinese standards do not cover the specific requirements on the implementation measures to temporary transitional resettlement.
		Resettlement and Livelihood Restoration Monitoring and Evaluation	2.4A.8.5	Chinese standards do not cover the requirements on the corrective action plan based on the completion audit of a resettlement action plan/ livelihoods restoration plan implementation.
	2.4 B - Historical Land Acquisition, Displacement, and Resettlement	Community Engagement	2.4B.3.1	Chinese standards do not propose the requirements on disclosure of due diligence and assessment of historical displacement and resettlement impacts, and the development, implementation, monitoring, and evaluation of a displacement resettlement plan.



IRMA 2.0 principle	IRMA 2.0 chapter name	Non-aligned criteria	IRMA 2.0 requirement no.	Rationale for non-alignment score
		Displacement Remediation Monitoring and Evaluation	2.4B.3.2	Chinese standards do not propose the requirements on disclosure of due diligence and assessment of historical displacement and resettlement impacts, and the development, implementation, monitoring, and evaluation of a displacement resettlement plan.
			2.4B.8.4	Chinese standards do not propose the specific requirements on the completion audit of DRP implementation and main component of the completion audit.
			2.4B.8.5	Chinese standards do not propose specific requirements on the corrective action plan and the component of the plan.
	2.5 Community Emergency Preparedness and Response	Public Liability Accident Insurance	2.5.7.1	Chinese standards do not propose the requirement on public liability accident insurance for unplanned accidents or unwanted events to companies.
	2.6 Planning and Financing Reclamation and Closure	Reclamation and Closure Planning	2.6.1.2	Chinese standards do not specify how to carry out the reclamation.
			2.6.1.3	Chinese standards do not propose the requirement on preparation of a site management plan (or equivalent), which will be implemented if operations at a mine/mineral processing site are suspended or unexpectedly cease.
			2.6.1.4	Chinese standards do not specify the requirement on the reclamation and closure plan and its implementation.



IRMA 2.0 principle	IRMA 2.0 chapter name	Non-aligned criteria	IRMA 2.0 requirement no.	Rationale for non-alignment score
			2.6.1.5	Chinese standards do not cover the requirement on calculating the reclamation and closure costs.
			2.6.1.6	Chinese standards do not cover the requirement on the frequency of reviewing and updating the reclamation and closure plan and estimated costs.
		Backfilling as a Part of Reclamation	2.6.2.1	Chinese standards do not specify the technical requirement on backfilling.
			2.6.2.2	Chinese standards do not cover the requirement on the reclamation and closure plan for projects/ operations with open pit mining operations.
			2.6.2.3	Chinese standards do not cover the requirement on the reclamation and closure plan for projects/ operations with underground exploration features or underground mining operations.
		Financial Assurance	2.6.3.1	Chinese standards do not cover the requirement on the financial assurance of reclamation and closure.
			2.6.3.2	Chinese standards do not cover the approach to calculate the long-term net present value calculations of any financial assurance.
3. Social Responsibility	3.1 Fair Labour and Terms of Work	Wages, Benefits, and Other Compensation	3.1.9.4	Chinese standards do not specify the requirements for companies about what compensation for work-related injuries and illnesses could be provided to the workers.



IRMA 2.0 principle	IRMA 2.0 chapter name	Non-aligned criteria	IRMA 2.0 requirement no.	Rationale for non-alignment score
			3.1.9.7	Chinese standards do not specify the restricted requirements for companies on deductions from wages.
			3.1.9.9	Chinese standards do not specify the requirements of accommodations for workers provided by the companies.
	3.2 Occupational Health and Safety	Health and Safety Management Plans and Procedures	3.2.3.7	Chinese standards do not specify the stop work authority procedure.
		Specific Measures to Protect Workers	3.2.4.6	Chinese standards do not specify the requirements on accommodations for workers or contractors provided by the company to adhere to best international practices.
4. Environmental Responsibility	4.2 Water Management	Water Management Planning and Implementation	4.2.4.4	Chinese standards do not specify the requirements on implementation of FPIC for a proposed project that requires long-term water treatment if it needs to obtain support from affected and/or Indigenous communities. They do not do not specify the requirements on the development and implementation of an action plan that contains all the practicable steps that can be taken to minimize the volume of water to be treated.
			4.2.4.5	Chinese standards do not specify the requirements on the actions to be taken if a surface water or groundwater mixing zone is proposed as a mitigation strategy.



IRMA 2.0 principle	IRMA 2.0 chapter name	Non-aligned criteria	IRMA 2.0 requirement no.	Rationale for non-alignment score
		Water Monitoring Program	4.2.5.1	Chinese standards do not specify the requirements on development and implementation of a program to monitor effects on water quantity and quality or the detailed content of this program.
		Comparison of Monitoring Results to Water Quality/Quantity Criteria	4.2.6.1	Chinese standards do not specify the requirements on results of water quality monitoring and compliance level with water quality criteria.
			4.2.6.2	Chinese standards do not specify the requirements on results of water quantity monitoring.
	4.X Management of Physical Stability	Scoping of Facilities with Potential Physical Stability Risks	4.X.1.1	Chinese standards do not cover the requirements on identifying each proposed and existing facility that may have physical stability risks that could impact the health, safety, or human rights of workers and communities or the environment.
			4.X.1.2	Chinese standards do not specify the requirements on the characterizations to be collected for the analysis of physical stability risks.
			4.X.1.3	Chinese standards do not specify the requirements on the characterizations to be collected to further inform physical stability risks for each existing facility.



IRMA 2.0 principle	IRMA 2.0 chapter name	Non-aligned criteria	IRMA 2.0 requirement no.	Rationale for non-alignment score
			4.X.1.4	Chinese standards do not specify all credible failure modes for each proposed and existing facility identified by the multi-disciplinary team of competent professionals and the types of credible failure modes those may include.
			4.X.1.5	Chinese standards do not cover the requirements on competent professionals to complete the facility breach analyses and runout or inundation analyses for the loss of all tailings and/or fluids, or the detailed results to be identified from each analysis of different scenarios.
			4.X.1.7	Chinese standards do not cover the requirements for companies to carry out an evaluation of the consequences of a facility failure by a multi-disciplinary team of competent professionals for each facility, nor the content of the evaluation.
			4.X.1.8	Chinese standards do not cover the requirements for the companies to review each facility's failure consequence classification and update it if necessary or the frequency of the review.
		Management of Physical Stability at Non-Critical Facilities	4.X.2.1	Chinese standards do not cover the requirement on "non-critical facility" and the requirements of one or more mode of credible failure for each non-critical facility.



IRMA 2.0 principle	IRMA 2.0 chapter name	Non-aligned criteria	IRMA 2.0 requirement no.	Rationale for non-alignment score
		Initial Assessment, Siting and Design of Critical Facilities	4.X.3.1	Chinese standards do not cover the requirement on conducting and documenting a multi-criteria alternatives analysis or similar process for facilities where the failure consequence classification is significant and there is potential loss of life, or the classification is high, very high, or extreme.
			4.X.3.2	Chinese standards do not propose the requirement for the companies to carry out a risk assessment to evaluate the risks to human rights and the health and safety of communities and the environment from all credible failure modes for each critical facility.
			4.X.3.4	Chinese standards do not cover the requirement on initial facility designs and the refinement of the design of critical facilities.
		Management of Physical Stability Risks at Critical Facilities	4.X.4.1–4.X.4.5	Chinese standards do not specify the requirement to identify each critical facility and related implementations requirements, including developing a system of accountability, responsibility, and personnel management for each critical facility; developing an operations, maintenance, and surveillance (OMS) manual (or equivalent) documented and implemented by competent professionals; ensuring that the personnel involved in the operations of each critical facility could access to the OMS manual and receive training on the OMS manual; and reviewing and updating OMS manual if needed annually, etc.



IRMA 2.0 principle	IRMA 2.0 chapter name	Non-aligned criteria	IRMA 2.0 requirement no.	Rationale for non-alignment score
		Critical Facility Oversight and Review Processes	4.X.5.1–4.X.5.5	Chinese standards do not specify the requirement to the companies to implement a program to oversee the quality of engineering work; conduct independent reviews for all critical facilities; carry out an independent dam safety review of technical, operational, and governance aspects of critical facilities; and implement and document an annual management review process to facilitate continual improvement in the management of critical facilities, etc.
			4.X.6.1	Chinese standards do not cover the requirement on publishing and updating plain language summaries for the information (such as: risk assessment, planned and implemented mitigation measures, etc.) on critical facilities.
	4.XX Land and Soil Management	Comparison of Monitoring Results to Soil Chemical Quality Criteria	4.XX.6.1	Chinese standards do not specify the requirements for the companies to demonstrate that the level of contaminants in soils are consistent with concentrations measured in baseline or background soil quality samples; or are being maintained at a level that protects current and potential future use of land and soil resources.

Source: Authors' analysis.

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