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IWA 45

Sustainable critical mineral supply chains

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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Foreword

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International Workshop Agreement IWA 45 was approved at workshops hosted in Tokyo (Japan), New York (USA) and a virtual workshop held in February 2024, April 2024 and May 2024 respectively.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Critical minerals are vital to the production of materials and equipment needed to deliver clean energy technologies. This means that we are increasingly relying on critical mineral supply chains, from mine to product, for the transition to net-zero emissions.

Simultaneously, we must ensure that hard-won environmental gains in critical mineral supply chains are not lost in the rush to deliver low, and zero, emission technologies, nor are the rights of communities and Indigenous people overlooked due to the new imperatives.

That presents the world with a challenge – to ensure a reliable supply of the materials needed to tackle climate change, while offering environmental and social protections which preserve human rights.

Sustainability frameworks, guidelines and standards are central to achieving these goals. They provide best-practice for the mining industry and corporations throughout the critical mineral supply chain as well as guidance for policy-makers seeking to ensure a responsible and reliable approach.

The ISO's International Workshop Agreement on Sustainable Critical Minerals Supply Chains (IWA 45) has been developed by a group of stakeholders from the mineral supply chain and designed for stakeholders in the critical mineral supply chains, who need such a framework to assess their operations and measure sustainability.

NOTE A list of IWA 45 participants is provided in Annex B.

This document is designed to assist those stakeholders in understanding the existing landscape of frameworks, guidelines and standards currently available and to determine which best suit their needs.

A survey was undertaken of a range of stakeholders across geographic regions to identify relevant frameworks, guidelines and standards that organizations are already using to assess and improve the sustainability of critical mineral supply chains.

This document examines governance structures, sustainability topic areas and requirements within existing frameworks. It details 30 frameworks, guidance and standards relevant to the sector. While there was no attempt to determine the effectiveness of any of these instruments in improving sustainability, this document provides an objective overview of the scope of governance, assurance processes and other factors. It also pays particular attention to provisions and recommendations held in common across the frameworks, as well as how they differ.

IWA participants identified many areas that should be considered in determining how extensively a standard covers sustainability issues, while assessing how existing frameworks approached the management of a wide variety of environmental, social, labour, human and Indigenous rights and transparency factors.

They concluded that, while standards and frameworks have a vital role to play in ensuring a sustainable critical mineral supply chain, it is important to avoid developing new ISO standards that duplicate or conflict with existing sustainability standards.

The IWA participants found no market need for another standard in the upstream or midstream segments of the minerals and metals sector. Instead, future ISO work is needed to explore the gaps that exist within the downstream standards landscape and how to best address them.

Above all, it is vital to engage with developing countries, Indigenous peoples and communities impacted by mining, to encourage more stakeholders to participate in developing international sustainability standards, to promote equal, shared governance and decision-making with rights holders and civil society organizations, while boosting training and building capacity for vulnerable populations.

Sustainable critical mineral supply chains

1 Scope

This document surveys the range of existing sustainability frameworks available for critical mineral supply chains to aid understanding and assist in improving an organization's sustainability outcomes. It includes an analysis of:

— the requirements contained in existing sustainability guides or frameworks and where these tools are similar and where they diverge;

— sustainability topic areas within existing guides and frameworks that have been accepted in different regions and jurisdictions.

This document did not assess the effectiveness of existing standards or frameworks in improving the sustainability performance of their users or how performance was assessed.

The results show that the existing sustainability frameworks are extensive and varied in the upstream supply chain. The analysis undertaken as part of this document will help inform the development of potential future ISO work programs and standards development, without duplicating or conflicting with existing frameworks.

This document can also be used by organizations outside of ISO with respect to understanding available sustainability standards or frameworks.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
air pollutant
material emitted into the atmosphere either by human activity or natural processes that adversely affects humans or the environment

[SOURCE: ISO 18158:2016, 2.1.2.1]

3.2
circular economy
economic system that uses a systemic approach to maintain a circular flow of resources, by recovering, retaining or adding to their value, while contributing to sustainable development

Note 1 to entry: Resources can be considered as concerning both stocks and flows.

Note 2 to entry: The inflow of virgin resources is kept as low as possible and the circular flow of resources is kept as closed as possible to minimize waste, losses and releases from the economic system.

[SOURCE: ISO 59004:2024, 3.1.1]

3.3
critical mineral
essential mineral or mineral-based resource necessary for a particular economic activity, the supply of which is deemed to be at risk and absence could have detrimental consequences to a commercial entity and to the economic, environmental, security and social well-being of a country, common economic region or specific region

Note 1 to entry: In this definition, 'mineral' includes metallic and non-metallic elements which in many cases are compounds or alloys.

Note 2 to entry: Frameworks, guidelines and standards referenced in this document can use different definitions of critical minerals.

3.4
financial assurance
financial instrument, required by a regulatory authority and provided by the mine owner or operator, if that company is unable or unwilling to perform required mine closure activities

Note 1 to entry: Financial instruments can include bond, levy payment or bank guarantee.

[SOURCE: ISO 20305:2020, 3.9.2]

3.5
environmental impact assessment
tool used to identify the environmental impacts of a project, asset and activity prior to decision-making

Note 1 to entry: The tool can be used to assess a project, asset and activity during its various stages, including when it is finished.

Note 2 to entry: An organization's activities or products or services can be a project, asset and activity to be considered for a request for financing.

[SOURCE: ISO 14100:2022, 3.1.6]

3.6
gender equality
equal rights, responsibilities and opportunities for women and men and girls and boys

Note 1 to entry: Gender equality does not mean that women and men, girls and boys, will become the same but that women's and men's rights, responsibilities and opportunities will not depend on whether they are born male or female.

Note 2 to entry: Gender equality implies that the interests, needs and priorities of both women and girls and men and boys, are taken into consideration, recognizing them in all their diversity.

[SOURCE: ISO 53800:2024, 3.4]

3.7
gender-based violence
sexual, physical, mental and economic harm inflicted in public or in private, this also includes threats of violence, coercion and manipulation.

Note 1 to entry: This definition is based on the description on gender-based violence provided by the United Nations High Commission on Refugees (UNHCR).[35]

3.8
hazardous material
item, element or substance with a potential for harm in terms of human injury or ill health (both short and long term), damage to property, damage to the environment, or a combination of these.

3.9
human rights
rights inherent to all human beings, whatever their nationality, place of residence, sex, national or ethnic origin, colour, religion, language or any other status.

Note 1 to entry: An authoritative list of the core internationally recognized human rights is contained in the International Bill of Human Rights (consisting of the Universal Declaration of Human Rights and the main instruments through which it has been codified: the International Covenant on Civil and Political Rights and the International Covenant on Economic, Social and Cultural Rights), coupled with the principles concerning rights in the 10 International Labour Organization (ILO) core conventions as set out in the Declaration on Fundamental Principles and Rights at Work.[33]

[SOURCE: ISO 22300:2021, 3.1.115, modified — Note 1 to entry added.]

3.10
Indigenous rights
broad range of collective and individual rights that constitute the minimum standards to protect the rights of Indigenous peoples and to contribute to their survival, dignity and well-being

Note 1 to entry: These include rights related to:

— equality and non-discrimination;

— self-determination, self-government and recognition of treaties;

— lands, territories and resources;

— environment;

— civil and political rights;

— participation in decision-making and indigenous institutions;

— economic and social rights;

— implementation and redress;

— culture, religion and language;

— education and media.

Note 2 to entry: This definition of Indigenous rights is as affirmed and set out in the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP).[34]

3.11
livelihood
capabilities, assets, income and activities required to obtain the necessities of life

Note 1 to entry: People pursue a variety of livelihood outcomes (such as more income, increased well-being, reduced vulnerability, improved food security) through various livelihood strategies. Livelihood strategies aim to build or contribute to an individual's livelihood assets- comprised of human capital, natural capital, financial capital, physical capital, social capital, and political capital.

[SOURCE: ISO/TR 19915:2023, 3.18]

3.12
extraction
procedure of mining and retrieving minerals from the earth or from waste rock and tailings that have previously been mined

3.13
mitigation hierarchy
step-by-step tool used to limit the negative impacts of development which has four steps that are followed in order, avoid, then minimise, then restore impacted areas and finally offset any impacts than remain

3.14
on-site processing
processing of ore at the same location as the mine.

3.15
recycling
recovery operation by which waste materials from mining (*mine waste* (3.20)), manufacturing processes or any other supply chain activity and products at end-of-life are collected and reprocessed into products, materials or substances, whether for the original or other purposes

3.16
social impact assessment
SIA
process by which an entity identifies actual and potential social or human rights risks from a project or a planned project

Note 1 to entry: The United Nations Guiding Principles on Business and Human Rights (UNGPs) stipulate that assessments should focus on risk to people, not risk to business. The International Association of Impact Assessment (IAIA) defines SIA as the processes of analysing, monitoring and managing the intended and unintended social consequences, both positive and negative, of planned interventions (policies, programs, plans, projects) and any social change processes invoked by those interventions. Its primary purpose is to bring about a more sustainable and equitable biophysical and human environment. [35]

3.17
supply chain
linked set of resources and processes that upon placement of a purchase order begins with the sourcing of raw material and extends through the manufacturing, processing, handling and delivery of goods and related services to the purchaser

Note 1 to entry: The supply chain may include vendors, manufacturing facilities, logistics providers, internal distribution centres, distributors, wholesalers and other entities involved in the manufacturing, processing, handling and delivery of the goods and their related services.

Note 2 to entry: The supply chain may include the recovery, processing and placing on the market of secondary materials.

[SOURCE: ISO 28001:2007, 3.24, modified — Note 2 to entry added.]

3.18
sustainability
state of the global system including environmental, social, and economic aspects, in which the needs of the present are met without compromising the ability of future generations to meet their own needs

Note 1 to entry: The environmental, social, and economic aspects interact, and are often referred to as the three dimensions of sustainability.

Note 2 to entry: Sustainability is the goal of sustainable development.

[SOURCE: ISO Guide 82:2019, 3.1]

3.19
sustainable development
development that meets the environmental, social and economic needs of the present without compromising the ability of future generations to meet their own needs.

Note 1 to entry: Derived from the Brundtland Report.[18]

[SOURCE: ISO Guide 82:2019, 3.2]

3.20
mine waste
materials derived from mining or processing activities, that are disaggregated and stored on site within a defined mine feature

Note 1 to entry: Generally, it includes all mine materials except topsoil and mine water.

3.21
waste rock
rock removed in the mining process, that does not contain ore and will not be processed

[SOURCE: ISO 20305:2020, 3.5.1.4]

4 Sustainability topic areas to consider in critical mineral supply chain standards

4.1 General

Sustainability topic areas that are important to consider in critical mineral supply chain standards include, but are not limited to, those described in 4.2 and 4.3.

4.2 Mineral exploration/extraction/mining/mineral recovery on-site processing/off-site processing and refining

4.2.1 Environment

— Biodiversity

— Climate change/greenhouse gas emissions

— Air pollutants

— Durability, reusability, repairability of products containing critical minerals

— Energy use

— Environment cost-benefit analysis

— Environmental impact assessment and permitting

— Hazardous materials

— Mine closure and reclamation, including long-term environmental monitoring and risk mitigation after closure

— Noise/vibration

— Non-greenhouse gas or climate change impacts (including loss of carbon sinks resulting from deforestation or destruction of wetlands)

— Non-tailings waste management

— Pollution management and control

— Physical hazards/mine security

— Radioactive materials

— Recycling

— Resource efficiency

— Resource use

— Soil quality

— Tailings management and tailings storage facility safety

— Transport-related impacts

— Waste management

— Waste rock management

— Water/wastewater management (including water pollutants, water treatment, and water use and reuse)

— Wider mine-site development impacts (including the establishment of human settlements, transport and other infrastructure)

4.2.2 Social

— Child/forced labour

— Community engagement/public participation

— Gender equality, women's economic empowerment, gender-based violence protection and prevention

— Grievance mechanisms

— Health and safety

— Human rights

— Human rights due diligence, as defined by UNGPs

— Human rights and environmental defenders

— Indigenous rights/Free, Prior, Informed Consent

— Involuntary resettlement

— Labour rights

— Land Rights

— Livelihoods/distribution of economic benefits/social cost-benefit analysis

— Mine closure and reclamation, including long-term social monitoring and risk mitigation after closure

— Protection of cultural resources and religious sites

— Social assessment

4.2.3 Economic/Governance

— Corruption

— Due diligence

— Financial assurance

— Mine closure and reclamation, including long-term social monitoring and risk mitigation after closure

— Transparency

4.3 Circularity and end of life

4.3.1 Environment

— Air pollutants

— Circular economy and lifecycle assessment

— Climate/greenhouse gas (GHG) emissions

— Hazardous materials

— Recycling and recovery

— Waste management

— Water/wastewater management

4.3.2 Social

— Gender equality and gender protection

— Human rights

— Indigenous Rights/ Free, Prior, Informed Consent

— Labour rights

— Social assessment

— Community planning for mine post-closure economic sustainability

4.3.3 Governance

— Corruption

— Due diligence

— Product labelling

— Public participation

— Transparency

4.3.4 Technical

— Durability, reusability, repairability of products containing critical minerals.

5 ISO Standards relevant to sustainable critical mineral supply chains

5.1 ISO standards under development

5.1.1 ISO/TC 298, Rare earth and ISO/TC 333, Lithium: joint working group 6 on sustainability (under development)

The scope of ISO Technical Committee (TC) 298, Rare earth and TC 333, Lithium, joint working group (JWG) 6 includes the standardization of rare earths and lithium sustainability across the value chain, including concentration, extraction, separation, refinement, conversion, recycling and reuse. The standard being developed will provide specific recommendations to allow organizations to set, plan and put into operation sustainable practices for criteria that are applied in either mineral or non-mineral specific ways. Previous

work in the former ISO/TC 298/WG 5 “Sustainability” and ISO/TC 333/WG 5 “Sustainability” included discussions on the following environmental social and governance (ESG) criteria.

a) Environmental:

- biodiversity and protected areas;
- brine management;
- emissions, air pollution, and dust;
- fresh water quality and consumptions;
- land use, land degradation, and soil contamination;
- mine closure and reclamation;
- noise and vibration;
- recycling;
- waste, materials and tailings management.

b) Social:

- community engagement;
- free, prior and informed consent;
- labour rights;
- occupational and health;
- training and education.

c) Governance:

- crisis management and communication;
- financial reclamation and closure;
- governance and ethical conduct;
- impact assessments;
- risk and energy management;
- supply chain management;
- traceability.

5.1.2 ISO/TC 82, SC 7, Sustainable mining and mine closure

The scope of ISO Technical Committee (TC) 82, Mining, Subcommittee (SC) 7, Sustainable mining and mine closure, includes the standardization of ESG aspects of mining to:

- minimize the negative impacts from mining through its life cycle and transition to post-mining land use;
- take action to combat climate change and its impacts;
- develop sustainable benefits and opportunities for local and regional communities;
- respect community cultural connections to places;
- adopt a long-term view that ensures inter-generational equity;

— embrace opportunities for innovation adopting the principles of the circular economy;

— enhance transparency of mining practices.

The work excludes:

— occupational health and safety aspects related to workplace activities covered by ISO/TC 283, risk management guidance provided in ISO 31000;

— industrial wastewater treatment and reuse, covered by ISO/TC 282, SC4, machinery.

5.2 Existing ISO standards

— ISO 14001, *Environmental management systems*

— ISO 14002-2, *Environmental management systems — Guidelines for using ISO 14001 to address environmental aspects and conditions within an environmental topic area — Part 2: Water*

— ISO 14002-4, *Environmental management systems — Guidelines for using ISO 14001 to address environmental aspects and conditions within an environmental topic area — Part 4: Resources and waste*[1)]

— ISO 14046, *Environmental management — water footprint – principles, requirements and guidelines*

— ISO 26000, *Guidance on social responsibility*

— ISO 3740, *Acoustics — determination of sound power levels of noise sources – guidelines for the use of basic standards*

— ISO 45001, *Occupational health and safety management systems — requirements with guidance for use*

— ISO 21795-1, *Mine closure and reclamation planning — Part 1: Requirements*

— ISO 21795-2, *Mine closure and reclamation planning — Part 2: Guidance*

— ISO 26000, *Guidance on social responsibility*

— ISO 37000, *Governance of organizations — Guidance*

— ISO 37101, *Sustainable development in communities — Management system for sustainable development — Requirements with guidance for use*

— ISO 45001, *Occupational health and safety management systems — Requirements with guidance for use*

— ISO 53800, *Guidelines for the promotion and implementation of gender equality and women's empowerment*

6 Assessment of existing sustainability frameworks relevant to critical mineral supply chains

6.1 Background

The ISO Strategic Advisory Group on Critical Minerals has identified a significant number of sustainability frameworks, including guidance and standards, available outside ISO. These have gained acceptance and have been implemented by the critical minerals industry and the broader minerals industry. As part of the IWA 45 process, views from a range of stakeholders were gathered across geographic regions to identify relevant frameworks, including standards and guidance, that organizations use to assess and improve the sustainability of critical mineral supply chains.

This document examines governance structures, sustainability topic areas and requirements within 30 existing frameworks which address aspects of sustainability across critical mineral supply chains.

1) Under preparation. Stage at the time of publication: ISO/AWI 14002-4.

The range of frameworks covered reflects those identified from the IWA 45 survey results, meetings, and input from IWA 45 participants. This analysis is called the Comparison Matrix. ISO Standards are not included, as the intent of this exercise was to look at what is currently in use by industry. Information on relevant ISO standards and workstreams can be found in Clause 5 of this document.

The information provided is a representation of either what the owning organization provided during the compilation of this information or was obtained by researchers through documentation review. The analysis of some frameworks contains more detail than for others and this is reflected in the comparison matrix. The analysis did not assess the effectiveness of existing standards or frameworks in improving the sustainability performance of their users, or how performance assessments in relation to specific environmental and social impacts were undertaken.

The intent of the IWA 45 comparison matrix is to provide an objective view of the scope of themes, governance and assurance processes and other details. IWA participants were invited to provide comments on this assessment, which were incorporated as far as possible. Subclause 6.2 discusses features the frameworks shared and how they differed, based on the assessment. A summary of the analysis can be found in Annex A and the detailed analysis can be found at: https://standards.iso.org/iso/iwa/45/.

NOTE The second meeting of IWA 45 featured a presentation on standards alignment initiatives, including the Consolidated Mining Standard Initiative (CMSI), a collaboration between Toward Sustainable Mining (TSM), CopperMark, the International Council on Mining and Metals (ICMM), and World Gold Council to consolidate their different voluntary responsible mining standards into one global standard that would supersede each organization's individual standards. Because the consolidated standard is not yet published, this effort was not included in the IWA 45 Assessment.

6.2 Commonalities and differences across frameworks

6.2.1 General

Subclause 6.2 provides a broad overview of the commonalities and differences across the development procedures and ESG criteria within the frameworks analysed. The subclauses represent key themes within the IWA analysis. A summary of the IWA 45 assessment can be found in Annex A. The detailed analysis is presented as a comparison matrix and can be found at: https://standards.iso.org/iso/iwa/45/. Table 1 provides an overview of the frameworks analysed, identifying if they are principle-based or performance-based frameworks, the part of the supply chain covered and whether the framework covers a specific mineral or is more general. The frameworks were categorized as either supply chain due diligence standards, performance/compliance standards, or principle-based standards. Due diligence standards focus on risk identification and mitigation relating to mineral supply chains, performance/compliance standards emphasize measurable benchmarks at the facility level, and principle-based standards offer flexible guidelines and best practices, which may extend beyond minerals supply chains or be sector-agnostic.

Table 1 — Sustainability frameworks for critical mineral supply chains

Framework (Organisation, Title of Standard/Framework)	Supply Chain Due Diligence Standard	Performance/ Conformity Standard	Principle-Based Framework
Aluminium Stewardship Initiative (ASI), ASI Performance standard [1]		X	
China Chamber of Commerce of Metals, Minerals & Chemicals Importers & Exporters (CCCMC), Chinese Due Diligence Guidelines for Responsible Mineral Supply Chains [2]	X		
China Chamber of Commerce of Metals, Minerals & Chemicals Importers & Exporters (CCCMC), Guidelines for Social Responsibility in Mining Investments (GSRM) [3]			X
DMT GmbH & Co. KG, TUV NORD CERA 4in1 Certification System [4]		X	
Extractive Industries Transparency Initiative (EITI), EITI Standard [5]			X
Financial Stability Board (FSB), Task Force on Climate Related Financial Disclosures (TCFD) [6]			X

Table 1 *(continued)*

Framework (Organisation, Title of Standard/Framework)	Supply Chain Due Diligence Standard	Performance/ Conformity Standard	Principle-Based Framework
Global Reporting Initiative (GRI) Standards, GRI [7]			X
Initiative for Responsible Mining Assurance (IRMA), Standard for Responsible Mining V1 [8]		X	
International Council on Mining and Metals (ICMM) Mining Principles [9]			X
International Finance Corporation (IFC), IFC Performance Standards on Environmental and Social Sustainability [10]		X	
International Financial Reporting Standards (IFRS), IFRS S1 General Requirements for Disclosure of Sustainability-related Financial Information; IFRS S2 Climate-related Disclosures [11]		X	
International Sustainability Standards Board (ISSB), Sustainability Accounting Standards Board (SASB) Standards [12]		X	
International Tin Association, Tin Code [13]		X	
International Tin Supply Chain Initiative (ITSCI) Joint Industry Traceability and Due Diligence Programme, ITSCI [14]	X		
Kimberley Process Certification Scheme (KPCS), Kimberley Process [15]	X		
London Bullion Market Association (LBMA), LBMA Responsible Gold Guidance International Bullion Centre Recommendations; Global Precious Metals Code [16]	X		
Responsible Cobalt Initiative (RCI) and the Responsible Minerals Initiative (RMI), Cobalt Refiner Supply Chain Due Diligence Standard (Version 2) [17]	X		
Responsible Cobalt Initiative the Global Battery Alliance's Cobalt Action Partnership and the Fair Cobalt Alliance, Cobalt Artisanal and Small-Scale Mining (ASM) ESG Management Framework [18]	X		
Responsible Jewellery Council (RJC), RJC Code of Practices (COP) RJC Chain of Custody Standard (CoC); RJC Code of Practices (COP) Standard [19]	X		
Responsible Minerals Initiative (RMI), Responsible Minerals Assurance Process (RMAP), Mineral Supply Chain Due Diligence (DD) [20]	X		
Responsible Minerals Initiative (RMI), Environmental, Social & Governance (ESG) Standard [21]		X	
Responsible Steel, The Responsible Steel International Standard [22]		X	
Task Force for Nature-related Financial Disclosure (TNFD), TNFD [23]			X
The Copper Mark, The Copper Mark Assurance Framework [24]		X	
The Expert Group on Resource Management (EGRM), United Nations Resource Management System (UNRMS) [25]			X
The International Cyanide Management Institute, International Cyanide Management Code [26]		X	
The Mining Association of Canada (MAC), Towards Sustainable Mining (TSM) [27]		X	
The Organisation for Economic Co-operation and Development (OECD), OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from conflict-affected and high-risk areas (CAHRAs) [28]			X
United Nations Environment Programme (UNEP) - Principles for Responsible Investment (PRI) - International Council on Mining and Metals (ICMM), Global Industry Standard on Tailings Management (GISTM) [29]		X	
World Gold Council, Responsible Gold Mining Principles (RGMPs) [30]		X	

6.2.2 Governance structure and stakeholder engagement

Standards organizations engage stakeholders in various ways during the development and governance of a standard or framework. In the existing frameworks assessed, stakeholder engagement in the development and governance falls on a spectrum, from no specified engagement of stakeholders to formal multi-stakeholder consultation processes, including stakeholder advisory panels, to equal shared decision-making and multi-stakeholder governance. Within that spectrum, while many frameworks include stakeholder participation in their governance structure, the frameworks vary greatly in the provision of multi-stakeholder decision-making and ability for stakeholders to meaningfully influence decision-making processes.

The IWA 45 Assessment also reviewed whether frameworks were International Social and Environmental Accreditation and Labelling Alliance (ISEAL) [31] community members and/ or code-compliant members. The ISEAL Code of Good Practice for Sustainability Systems provides a globally recognized framework, defining practices for effective and credible sustainability systems, including standards-setting development processes, conformity assessment, and ecolabel management. The ISEAL Code of Good Practice for Sustainability Systems includes requirements for stakeholder participation in the development or revision process of standards, including public consultation on the standard, balanced participation in the consultation process, responding to public comments, balanced decision-making about the standard that ensures the governance decision-making body is open to all stakeholders, balanced and diverse, and consensus-based decision-making.

The IWA 45 Assessment of existing sustainability frameworks includes the following aspects of stakeholder engagement in the governance structure of the frameworks.

— Composition of stakeholders.

— Board composition (including any specific voting and decision-making provisions).

— Stakeholder participation in the standard setting process.

— ISEAL membership/ code compliance.

6.2.3 Continual Improvement

Several frameworks define processes and timelines allowing for their review and update to ensure continued improvement, relevance and alignment with current industry best management practices. Some frameworks regularly review their objectives, strategies and the performance of their tools and systems. The reviews can include an evaluation of the impacts and outcomes of the framework and apply these lessons. Review cycles allow a standard to respond to new evidence, stakeholder input, external changes and to adapt its strategies to improve its impacts and remain fit for purpose. The frameworks differ in review and update cycles. They also differ in their guiding frameworks for monitoring, evaluation and learning (MEL) activities to support the frameworks impact and improvement. The ISEAL Code of Good Practice provides an example of requirements for MEL standard performance for continual improvement.

Several frameworks also specify different levels of achievement within their certification systems to reflect and recognize increasingly higher levels of performance within the given framework. The IWA 45 Assessment did not consider whether the framework includes performance monitoring and evaluation to measure improvements in sustainability performance.

IWA participants observed that the organization of hierarchal tiers can assist in recognizing high achievers while acknowledging participants with some degree of sustainable operations and allowing for continued improvement. This inclusivity allows more participants to enter the program and incentivizes improved performance within the given framework as participants build sustainability capacity. Some standards require third-party certification to reach certain tiers or levels of achievement.

The IWA 45 assessment includes the following aspects of the processes to review and update frameworks and levels of certification:

— progressivity of review/update cycles;

— tiers of standard certification.

6.2.4 Conformity assessment

The ISO Committee on Conformity Assessment (CASCO) develops standards related to conformity assessment, e commonly known as the CASCO Toolbox. Conformity assessment is the demonstration that specifies requirements are fulfilled. Specified requirements can be stated in normative documents such as regulations, standards and technical specifications. Conformity assessment includes activities such as testing, inspection, validation, verification, certification and accreditation. The collection of all activities that are repeatedly applied to a specified group of products, processes, services, systems, persons or bodies is referred to as a 'conformity assessment scheme' or 'scheme'.

The functional approach is the basis of all types of conformity assessment. It is composed of the selection, determination, review, decision and attestation, and surveillance, when required. An attestation that fulfilment has been demonstrated is issued based on the decision. Support for on-going validity of the attestation can be accomplished through surveillance, or continuous/periodic monitoring. Accreditation provides an additional layer of confidence. It is a third-party attestation related to a conformity assessment body (certification/inspection/verification/validation body, laboratory) conveying formal demonstration of its competence, consistent operation and impartiality in performing specific conformity assessment activities.

Conformity assessment is defined in ISO/IEC 17000 as the "demonstration that specified requirements are fulfilled". ISO/IEC 17020 defines requirements for the operation of various types of bodies performing inspections. The broad definition of inspection in the standard allows greater flexibility in application from systems to services and raw material to finished products. Audit activities use an organized, predictable process for assessing records and other information to determine whether requirements have been fulfilled. ISO/IEC 17000 defines an audit as a "process for obtaining relevant information about an object of conformity assessment and evaluating its objectively to determine the extent to which specified requirements are fulfilled". The ISO/IEC 17021 series outlines requirements for certification bodies to ensure that management system certifications are performed in a consistent, competent, and impartial manner. The audit activity may provide assurance of a credible management system certification. Certification is defined in ISO/IEC 17000 as "third-party attestation related to an object of conformity assessment, with the exception of accreditation." ISO/IEC 17065 identifies the general requirements for certification bodies to ensure they are competent, apply consistent processes, and operate in an impartial manner to facilitate national and international trade of certified products, processes and services.

The frameworks in the IWA 45 Assessment rely on different conformity assessment requirements to provide a verification system that a standard or technical specification has been applied.

The IWA 45 Assessment of existing sustainability frameworks include the following:

— assurance standards (adherence to specific iso or other standards);

— self-assessment;

— document analysis;

— site inspection;

— independence of auditors;

— involvement of affected parties in audits/ access and participation;

— grievance mechanisms;

— whistle blowing protection;

— transparency of audits/ publication of audits;

— correction action plans/ monitoring;

— disclaimers/legal liability documents.

IWA 45 participants noted that the conformity assessment requirements across frameworks vary considerably. Some frameworks have robust independent assessment requirements, whilst others rely on declarations of assurance based on partial disclosure of self-assessment. Some frameworks require full transparency and public publication of audits and detailed audit results and some do not. Some frameworks provide recommendations to include many aspects of audits but do not require these audits, some frameworks recommend and/or encourage policies around these issues be put in place without any validation component, whilst some frameworks do not specify specific conformity assessment requirements. These divergences impact the quality of the audits and the credibility of the audit results, holding implications for rights holders and regulators.

NOTE Divergences have implications for rights holders. Abuses and risks can be under-reported or missed by the audit and therefore go unchallenged. This can impact the ability of regulatory structures relying on these audits in their compliance processes to have accurate information to ensure companies are held accountable.

6.2.5 Environmental protection and health and safety

IWA participants identified many areas that should be considered in determining how extensively a standard covers environmental issues.

The IWA 45 assessment of existing sustainability frameworks include the following aspects of environmental protection and health and safety standards:

— environmental aspects/impacts;

— specific requirements on environmental impact assessment process and permitting;

— specific requirement on climate change GHG emissions (such as technology requirements etc.);

— specific requirement on air quality;

— specific requirement on waste rock management and rock dump stability;

— specific requirement on tailings management and tailings storage facility safety;

— specific requirement on reclamation and closure;

— specific requirement on emergency preparedness, response and recovery to protect workers and communities;

— specific requirement on addressing hazardous materials management;

— water Management:

  — specific requirement on water quality;

  — specific requirement on water quantity;

  — specific requirement on water protection and wastewater management;

— biodiversity:

  — prohibition of activities in protected areas;

  — biodiversity management planning.

The aspects listed above were examined in the IWA 45 Assessment. Other aspects that can be considered in a sustainability framework are:

— pollution management and control;

— land cover change;

— soil quality;

— resource use;

— non-tailings waste management;

— transport-related impacts;

— non-GHG climate change impacts (including loss of carbon sinks resulting from deforestation or destruction of wetlands)

— energy use;

— wider mine-site development impacts (including establishment of human settlements, transport and other infrastructure).

IWA participants noted that many standards require that projects meet their criteria or those dictated by local law, whichever is more stringent.

Mining and processing frameworks, including standards and guidance, differ in their scope of environmental impacts and specificity of requirements, with few standards covering the full scope of the topics identified above.

Regarding environmental impact assessment, a few of the frameworks require an environmental impact assessment of mining projects to be conducted. Several of the frameworks require risk assessments (which is a method of assessing environmental risks) for some specific areas such as water, waste, or tailings management as opposed to a more holistic environmental impact assessment. The level of detail specified in the frameworks that required environmental impact assessments or risk assessments varied broadly.

Most of the standards include requirements related to water quality, water quantity and water management planning. The scope and specificity of the requirements vary. Some standards require specific criteria for water quality protection to be met or define specific performance goals related to protection of existing water uses. Other standards simply require that water management plans and objectives be established and implemented, but do not require that the implementation of measures to meet performance-based goals for water quality or quantity protection.

Most of the standards include requirements related to GHG emissions, some of which set specific performance or reduction goals. Some of the standards, but not all, have additional requirements for other aspects of air quality (e.g. dust and chemical emissions) which can impact people and the environment.

Most of the mining standards have requirements related to tailings management. The safety of tailings facilities is of significant concern since failures can cause severe impacts and fatalities. Some of the standards require consistency with the Global Industry Standard on Tailings Management or have consistent or more stringent requirements. Some of the standards additionally include requirements for waste rock and hazardous waste management. Some of the standards related to waste rock and hazardous wastes are quite specific and others less so. For example, a few standards set requirements for waste rock management and that waste management follow the mitigation hierarchy. Other standards do not include specific requirements.

Some of the standards have requirements for reclamation, closure and financial assurance. Some of the standards have no requirements or state that this is optional. The level of detail varies from requiring specific requirements on financial assurance, reclamation and closure plans to no requirements. A few standards require specific performance goals for stability, future site use and other factors.

Regarding hazardous materials management, some frameworks do not mention hazardous materials management, whereas others have requirements for storage, transport and handling of hazardous materials. Some frameworks have requirements for specific hazardous substances like cyanide and mercury.

In general, many of the standards address some aspects of the areas important to environmental protection and several of the standards address most of the topics. However, there is wide variation in the level of comprehensiveness and specificity across the standards reviewed.

6.2.6 Labour protections

Some frameworks in the IWA 45 Assessment reference one or more of the international labour standards, as defined by the International Labour Organization (ILO). These include the fundamental principles and rights at work and their corresponding core labour conventions.

a) Freedom of association and the effective recognition of the right to collective bargaining:

   1) Freedom of Association and Protection of the Right to Organize Convention, 1948 (No. 87);

   2) Right to Organize and Collective Bargaining Convention, 1949 (No. 98).

b) The elimination of all forms of forced or compulsory labour:

   1) Forced Labour Convention, 1930 (No. 29) (and its 2014 Protocol);

   2) Abolition of Forced Labour Convention, 1957 (No. 105).

c) The effective abolition of child labour:

   1) Minimum Age Convention, 1973 (No. 138);

   2) Worst Forms of Child Labour Convention, 1999 (No. 182).

d) The elimination of discrimination in respect of employment and occupation:

   1) Equal Remuneration Convention, 1951 (No. 100);

   2) Discrimination (Employment and Occupation) Convention, 1958 (No. 111).

e) A safe and healthy working environment:

   1) Occupational Safety and Health Convention, 1981 (No. 155);

   2) Promotional Framework for Occupational Safety and Health Convention, 2006 (No. 187).

The Declaration on Fundamental Principles and Rights at Work and the 10 core conventions provide guidance and benchmarks for responsible business conduct and the protection of workers in critical mineral supply chains. Worker voice – a bedrock principle of labour relations – is the ability of workers to come together, collectively articulate their demands and work to achieve better terms and conditions. It is underpinned by the enabling rights of freedom of association and the right to collective bargaining.

Few of the frameworks refer to all five Fundamental Principles and Rights at Work (FPRW). Those standards that reference any of the FPRW or their corresponding conventions, most frequently reference the effective abolition of child labour and the elimination of all forms of forced and compulsory labour (ILO conventions No. 29, No. 105, No. 138, and No. 182).

There are additional international labour standards specific to mining, such as the Safety and Health in Mines Convention, 1995 (No. 176). Standards also address job quality indicators, such as minimum wages, hours of work and benefits. Many countries have legally committed to uphold standards on acceptable conditions of work as related to these indicators as part of their free trade agreements. None of the frameworks in the IWA 45 Assessment reference the Safety and Health in Mines Convention.

Only some standards in this analysis address occupational safety and health issues. IWA participants noted that sustainability frameworks, audits and certification schemes are not equipped to account for egregious labour rights abuses including state-imposed forced labour, slavery, gender-based workplace violence and harassment, as many of these issues are within the exclusive purview of regulatory enforcement and thus the responsibility of states.

The IWA 45 Assessment of existing sustainability frameworks includes the following aspects of labour:

— specific requirements to promote diversity, equity and inclusion for all in the workplace;

— specific requirements for workers' rights to healthy, safe and respectful working conditions.

6.2.7 Community and social responsibility

Many of the assessed frameworks call for respect of human and Indigenous rights, consultations with communities and the requirement of organizations to report on their actions affecting those communities.

Some frameworks set out specific requirements to ensure that Free Prior and Informed Consent (FPIC) is obtained from Indigenous Peoples, and some frameworks also require that organizations include vulnerable groups or communities in decision-making or when carrying out social assessments. In some instances, these vulnerable populations' and Indigenous groups' rights requirements reference regulatory mandates, such as the EU Non-financial Reporting Directive. A group of frameworks also calls for the use of globally relevant benchmarks such as the UNGPs or the OECD Guidelines for Multinational Enterprises when looking into those requirements. It should be noted that some standards do not include these topics.

The UN Guiding Principles stipulate that social impact assessments should focus on risk to people, not risk to business. The International Association for Impact Assessment (IAIA) defines SIA as the processes of analysing, monitoring and managing the intended and unintended social consequences, both positive and negative, of planned interventions (policies, programs, plans, projects) and any social change processes invoked by those interventions. Its primary purpose is to bring about a more sustainable and equitable biophysical and human environment.

The presence of human and Indigenous groups' rights requirements are core components of sustainability. Their inclusion denotes a recognition of a need to assess, monitor, manage, and report on the impacts, either intended or unintended, on those groups' status quo. It is also evident from the IWA 45 assessment that there is no harmonized approach to treating these requirements, arguably with some standards tailoring their approach to specific realities in a sector or sub-sector or groups' interests.

The IWA 45 assessment of existing sustainability frameworks includes the following aspects of community and social responsibility.

— Whether the scope of the framework includes human rights/social assessment/due diligence/community and Indigenous consultation.

— Whether the criterion within the framework includes specific requirements addressing human rights/social assessment/due diligence/community and Indigenous consultation.

— Specific requirements addressing involuntary resettlement.

— Specific requirements for contributing to economic and social development of affected communities.

— Specific requirement to contribute to the formalization of artisanal and small-scale mining (ASM) where it is safe and legally or legitimately possible.

— Specific requirements addressing community engagement/public participation/consultation.

— Specific requirement addressing Indigenous peoples' consultation and rights to FPIC, including over cultural heritage.

6.2.8 Ethical Business Practices and Transparency

Many frameworks assessed include information on ethical business practices and transparency. Many of the standards also had requirements for meeting applicable law. Some frameworks required extensive public disclosure of ESG information, others required disclosure of only some information and others had no policy. Many of the standards also address anti-corruption.

The IWA 45 assessment of existing sustainability frameworks include the following aspects.

— Specific requirement to conduct risk assessment of ESG issues.

— Specific requirements for business Conduct in compliance with applicable laws, including international laws and cross-jurisdictional obligations.

— Specific requirements for standards of business integrity including prevention of bribery, money laundering, and anti-competitive behaviour.

— Specific requirements for responsible business conduct in supply chains through implementation of risk-based due diligence.

— Specific requirements for public disclosure of all material payments to governments and all other forms of payments or benefits.

— Specific requirements for public disclosure on material ESG issues.

NOTE The aspects listed above were examined in the IWA 45 Assessment. Other aspects that can be included in a sustainability framework related to ethical business practices and transparency were identified during IWA Workshops and feedback and have been included as part of the recommendations (for example, information related to corruption, see 7.3).

7 Conclusion

7.1 General

Four key topic areas were identified for recommendations during the IWA 45 workshops. These cover:

— coherence, co-ordination and co-operation;

— stakeholder engagement and governance;

— topic areas for inclusion in sustainability standards;

— priority areas for future international standardization.

Although recommendations relevant to indigenous and gender matters are covered under 7.3 and 7.4, it is important to note that the consideration of and respect for the rights of Indigenous peoples, women, and gender non-conforming people is important for effective governance and functioning of a framework for sustainable critical mineral supply chains.

7.2 Coherence, coordination and cooperation

There are already several sustainability standards in existence, with various degrees of coverage according to the criteria highlighted in Clause 4 and IWA participants stressed the need to avoid developing new ISO standards that duplicate or conflict with existing sustainability standards.

There is, however, a need for existing standards and frameworks to address all significant environmental, social and governance aspects and impacts more comprehensively and for additional downstream standards to be developed which address all sustainability aspects and impacts identified.

The vast majority of IWA participants, both at workshops and in written submissions, strongly highlighted that there is no market need for another standard in the upstream or midstream segments of the critical mineral supply chain. Instead, future ISO work should explore the gaps that exist in the downstream standards landscape and how to best address these.

IWA participants also stressed the importance of cooperation and coordination between standards development efforts both within ISO and outside the organization. As described in 5.1, there are at least two separate ISO committees with standards under development addressing various sustainability topics for critical mineral supply chains (ISO/TC 298, Rare Earth and ISO/TC 333, Lithium: JWG 6 on Sustainability and ISO/TC 82/SC 7, Sustainable Mining and Mine Closure). In addition, Technical Committee 345, Specialty metals and minerals and Project Committee 348, Sustainable raw materials (PC 348) have been approved. TC 345 commenced work in May 2024 and PC 348 will meet for the first time at the end of October 2024. Liaisons should be established between these ISO committees to prevent overlap and conflict between the scopes of work and standardization criteria developed by of the committees. Liaisons can also help prevent “gaps” and help to ensure that ISO standards appropriately address the key sustainability criteria outlined

in Clause 4. ISO could also consider consolidating the work of these three committees (see recommendation 7.3 b) below).

JWG6, TC 82/SC 7 and PC 348 should also invite major standards organizations outside ISO to become liaison members to these committees. This is particularly important for other performance-based standards systems that are used broadly throughout the supply chain and that apply to most or all critical minerals, especially noting the significant risk of duplication, procedural fairness, and resourcing concerns raised by several IWA participants.

Finally, the IWA 45 Assessment identified several relevant intergovernmental frameworks and agreements on human rights, labour and social issues such as UNGPs. It is important that sustainability standards efforts carried out by ISO or other standards bodies consider these intergovernmental frameworks, standards, principles, and agreements.

7.3 Stakeholder Engagement and Governance

"Standards are the distilled wisdom of people with expertise in their subject matter and who know the needs of the organizations they represent."[32]

Existing sustainability standards for critical mineral supply chains, as described in Clause 6, entail both objective and subjective measures, leading to decisions which impact the environment, socio-economic development, health, human rights, and many other issues. Many deposits of critical minerals are found in developing countries and can be on or near Indigenous peoples' lands. As a result, sustainability standards often entail special consideration of Indigenous peoples' rights to FPIC.

It is essential to ensure that rights holders, subject matter experts, and people who understand the needs of impacted communities be actively engaged in the ISO standards development processes. Civil Society Organizations (CSOs) and Indigenous peoples or groups should have a dedicated, permanent seat with voting power in the development and governance of standards/frameworks on matters such as critical mineral supply chains and not merely listening sessions or the replication of a process (such as ISO 26000) which ends the opportunity for this form of engagement after the standard is published.

IWA participants recommended the following to support this objective:

a) Listening sessions with developing countries, Indigenous peoples, survivors, communities impacted by mining and the NGOs that amplify their voices. These stakeholders are under-represented in the IWA stakeholders. This may have been due to these stakeholders' limited experience with and exposure to ISO, time constraints, language barriers, or inability to travel. Early in the process of developing standards on critical minerals, ISO Committees developing standards on suitability aspects of critical mineral supply chains should consider organizing targeted listening session(s) with these stakeholders to ensure that their perspectives are more fully heard and considered.

b) Consolidate workstreams to encourage more robust stakeholder participation. There are significant challenges to participate in the multiple efforts to develop international sustainability standards for critical mineral supply chains, both within and outside of ISO. Resource limitations, competing global priorities and other factors create significant barriers to effective participation by subject matter experts from developing countries, Indigenous people and the NGOs that amplify their voices, as well as industry. Spreading sustainability topics between multiple international standards development "tables" puts burdens and constraints on all stakeholders. In addition to the recommendations for "coherence", ISO should consider consolidating the activities of the three committees addressing sustainability topics (JWG 6, TC 82/SC 7, PC 348).

c) Equal governance and decision-making. ISO committees addressing sustainability topics for critical mineral supply chains should strive for equal, shared governance and decision-making with rights holders and civil society organizations in the governance and development of sustainability standards. At a minimum, this means:

   — Equal governance of rights holders and civil society: affected rights holders, their representatives and/or civil society organizations are allocated 50 % representation and decision-making power overall and reflect a gender balanced representation.

— Affected rights holders, their representatives and/or civil society organizations maintain equal decision-making power with industry regarding the implementation of the standard.

Consideration should also be given to the difficulties Indigenous communities (such as federally recognized tribes) and the NGOs that amplify their voices, as well as consumer protection organisations, may face with the national delegation-based process that requires representation on a national basis.

The process to develop critical mineral supply chain sustainability standards may draw upon the experience of past examples, such as ISO 26000. ISO 26000 provides an example of an ISO standard developed using a multi-stakeholder approach involving experts from more than 90 countries and 40 international or broadly-based regional organizations involved in different aspects of social responsibility. A parent committee could carefully monitor the stakeholder categories of experts on working groups to ensure no group unfairly dominated the membership.

d) Capacity building and technical assistance. There is a need for funding to offset the costs to participate in ISO processes (e.g. travel, etc.) and training/capacity building for populations in vulnerable situations and Indigenous populations, particularly in developing countries. Further, IWA members highlighted the challenges that these populations may face in accessing ISO standards once they are published.

7.4 Topic areas for Sustainability Standards

7.4.1 General

The IWA participants identified sustainability topic areas that should be considered in sustainability standards across critical mineral supply chains. This criterion is listed in Clause 4 of this document.

7.4.2 Recommendations

Based on IWA discussions and the analysis of commonalities and differences among the broad range of existing frameworks in Clause 6 of this document, the IWA participants identified that the following aspects are important for sustainability standards to maximize the potential for a standard to have meaningful positive impact on the ground and drive change and continuous improvement in the sector:

a) Transparency and clarity.

— Clear scope of application, providing clear information on the supply chain stages and sustainability aspects covered, and making sure this is adapted to the need of the standard users.

— Publicly available transparent methodology and procedures for development and implementation of the standard.

— Ensuring that all relevant standards documents (including standard requirements/indicators/metrics, assessment and verification protocols, means of verification and auditing guidance) are reasonably available to all stakeholders. This includes rights holders and Indigenous communities. To improve accountability, it is essential that all stakeholders are able review relevant documents and understand what the standard does and what it does not do.

— Ensuring inclusion of anti-corruption measures due to the social and environmental consequences of such practices.

— NOTE For specific recommendations on governance refer to 7.3.

b) Conformity Assessment and Compliance Assurance.

— Encourage utilization of conformity assessment mechanisms already established in existing sustainability standards.

— Robust and independent assurance/verification systems: to ensure that the requirements or metrics are measurable, assessable and comparable, where applicable.

— Mandatory independent third-party audits, including on-site visits with extensive interviews of local stakeholders, Indigenous rights holders, and workers including organized labour representatives. Given the nature of the industry and its inherent risks and impacts, desk-based research is not sufficient. On-site visits can maximize opportunities for a more meaningful understanding and assessment of the company's performance and responsible practice.

To ensure effectiveness and transparency and to drive continuous improvement, third-party audit systems should include the following.

— Achievement levels resulting from an audit are not pass/fail but scored with rationale for scores and attached to a plan and performance monitoring and evaluation to drive continuous improvement.

— Systems to assess the effectiveness of measures taken and quality control including independent, site-level audits, auditor training, consistent interpretation of audits; processes and systems for the continuous improvement of the standard or framework and the sustainability performance of the organisation using the standard or framework.

— Requirements for corrective action planning and implementation of these corrective actions by companies based on results of audit against the standard/framework.

— Requirements to give workers, communities, and other rightsholders a collective voice in grievance and remedy mechanisms to promote accountability for outcomes.

To ensure meaningful participation of stakeholders, audits should include the following.

— Integration of stakeholder engagement and perspectives as a key element of the assessment and audit processes to allow for consideration of diverse and inclusive concerns and viewpoints, including gender balance.

— Taking appropriate precautions to guarantee confidentiality and protect stakeholders from reprisal.

— Requirements that detailed, transparent audit reports that are made freely accessible to the public.

c) Environment and social requirements.

— Strong environmental and social standards requirements with specific and performance-based metrics, including robust monitoring.

— Requirement for assessments based on the Mitigation Hierarchy whereby the prevention of impacts is prioritized over the minimization, mitigation and off-setting of impacts (in this order).

— Requirements for monitoring and evaluation with accepted assessment methodologies and indicators to be used so that performance can be compared between organizations.

— Requirements for environmental and social impact assessments before mining operations start and for significant project expansions or changes.

— Adopt human rights and environmental due diligence (HREDD) aligned with the UNGPs and OECD Guidance for Responsible Business Conduct.

— Grievance mechanisms that are aligned with the effectiveness criteria of the UN Guiding Principles on Business and Human Rights (which means they meet the specified criteria of legitimacy, accessibility, predictability, equity, transparency, and rights-compatibility).

— Incorporate internationally recognized labour rights and commitments to adhere to the labour rights principles articulated in the ILO's Declaration on Fundamental Principles and Rights at work. Commitments should be guided by the ten corresponding core ILO conventions and should include participation from representative workers' organizations in identifying problems, building solutions, and administering effective grievance mechanisms.

— The right to self-determination for Indigenous peoples and the FPIC principle in line with the UNDRIP. Proposals to require mere "consultation" of affected Indigenous Peoples would be insufficient where, for example, a project may cause the permanent relocation of the Indigenous peoples from their lands.

7.5 Priority areas for future international standardization

7.5.1 General

There are many existing sustainability frameworks, including guidance and standards, in the upstream and midstream supply chains and the IWA 45 determines that the creation of a new ISO standard in these supply chains is not required.

There are, however, gaps in existing frameworks for the downstream aspects of the supply chain. These gaps include embedding minerals circularity, traceability and labelling criteria for sustainable mineral supply chains. Closing these gaps would play an important role in facilitating global coherence on circularity and in supporting the green energy transition.

7.5.2 Recommendations

7.5.2.1 General

ISO has considerable experience on the topics of circularity, traceability and labelling and has strong representation of many of the relevant stakeholders and thought leaders. Focus should be placed in parts of the supply chain where gaps exist in standardization, this will help best focus the efforts of global experts to address following pressing topics in 7.5.2.2 and 7.5.2.3.

7.5.2.2 Circularity and end of life

The IWA identified that there is a need for standards that embed minerals circularity for sustainable mineral supply chains. Strong circular design requirements should ensure durability, reusability, repairability and recyclability of equipment and components that contain critical minerals. The concept of a circular rconomy, principles, and actions for its implementation are discussed and standardized in ISO/TC 323, *Circular Economy*. Standards that assess the performance and durability of products containing critical minerals, components and equipment, and technical specifications to facilitate repair, reuse and recycling recycle of products containing critical minerals, components and equipment should be discussed with ISO/TC 323.

These standards should include the following considerations.

a) Technical:

- circular product design requirements that ensure durability, reusability, and repairability of products that contain critical minerals;
- horizontal standards to assess performance and durability of products containing critical minerals;
- technical specifications to facilitate repair, reuse and recycling of products, components, and equipment that contain critical minerals;
- 4.2.1 requirements for technologies and practices of critical minerals recovery.

b) Environmental and social:

- exposure to toxic chemicals that pose risks to worker health and safety;
- variance in GHG emissions, energy, and water intensity of recycling processes;
- international connections to end of life management processes the cause disproportionate, unequal risk, impacts, and potential harm to workers.

7.5.2.3 Provenance and traceability

Traceability is the physical tracking of minerals through all points in the supply chain from the mine of origin, processing, refining, point of export, manufacturing, recycling and end-of-life. Transparency and traceability along critical mineral supply chains is a linchpin to commodity differentiation and the uptake of strong sustainability standards in the upstream supply.

Enhancing product traceability requires the establishment of standardized tracking systems, the creation of tools and technologies for tracing minerals through the supply chain and the development of labelling mechanisms for companies to demonstrate that the materials used for their manufacturing were sourced responsibly.

The IWA identified that there are current efforts to create tracking systems and labelling mechanisms for critical mineral supply chains are that these are being developed to work in concert with traceability services and technologies (e.g. block chain, mineral ID scanning, geochemical fingerprinting and testing). These include the Initiative for Responsible Mining Assurance (IRMA) Chain of Custody Standard, the Responsible Mining Initiative's (RMI) Responsible Minerals Assurance Process (RMAP) and ISO/TC 308.

However, there is no global agreement around an international standardized mechanism or technology for tracing critical minerals from mining, through processing, to the manufacturer.

NOTE It is acknowledged that establishing a standardized approach to traceability is challenging, for critical minerals.

ISO should explore development of international standards for traceability requirements including data collection requirements, data collection methodologies, and labelling requirements. This work should be done in liaison with existing efforts in ISO (e.g. ISO/TC 298, Rare earths who have published ISO 23664, ISO/TC 308, Chain of Custody and ISO/TC 307, Blockchain).

Annex A
(Informative)

Standards/frameworks comparison matrix

Table A.1 is an extract of the comparison matrix, the complete matrix with detailed analysis is available at: https://standards.iso.org/iso/iwa/45/.

Table A.1 — Sustainability frameworks for critical mineral supply chains

Name of organisation developing framework	Framework	Type of framework	Notes on topics covered	Scope of applicability within mineral supply chain	Specific commodity (mineral and/or Products)
Aluminium Stewardship Initiative	Aluminium Stewardship Initiative (ASI) Performance standard	Performance/ Conformity Standard	The Aluminium Stewardship Initiative (ASI) is a global non-profit standards setting and certification organisation.	Multiple - Mineral Processing, Manufacturing	Aluminium
China Chamber of Commerce of Metals, Minerals & Chemicals Importers & Exporters (CCCMC)	Chinese Due Diligence Guidelines for Responsible Mineral Supply Chains	Supply Chain Due Diligence Standard	The Guidelines are designed to align Chinese company due diligence with international standards and allow for mutual recognition with existing international initiatives and legislations. The Guidelines will apply to all Chinese companies which are extracting and/or using mineral resources and their related products and are engaged at any point in the supply chain of minerals. Companies using or engaged in the supply chain of other natural resources are also encouraged to use the Guidelines as a reference.	Multiple - LSM, ASM, Mineral Processing	Multiple
China Chamber of Commerce of Metals, Minerals & Chemicals Importers & Exporters (CCCMC)	Guidelines for Social Responsibility in Mining Investments	Principle-Based Framework	The Guidelines are designed to align Chinese company due diligence with international standards and allow for mutual recognition with existing international initiatives and legislations. The Guidelines will apply to all Chinese companies which are extracting and/or using mineral resources and their related products and are engaged at any point in the supply chain of minerals. Companies using or engaged in the supply chain of other natural resources are also encouraged to use the Guidelines as a reference.	Multiple - LSM, ASM	Non-Specific
DMT GmbH & Co. KG	TN CERA 4in1 Certification System	Performance/ Conformity Standard	In order to achieve Sustainable development and achievement of the Sustainable Development Goals (SDGs), the CERA 4in1 certification system (CERA 4in1) was introduced as a scheme for the development of responsible mineral raw materials supply chains. It aims to provide requirements for the implementation of responsible production practices as well as for the traceability of responsibly sourced materials.	Non-Sector Specific	Multiple
Extractive Industries Transparency Initiative (EITI)	Extractive Industries Transparency Initiative (EITI) Standard	Principle-Based Framework	The EITI Standard has its origins in the EITI Principles (Section 1), which were agreed by a diverse group of countries, companies and civil society organisations when the EITI was formed in 2003, to increase transparency over payments and revenues in the extractive sector.	Non-Sector Specific	Non-Specific

Table A.1 *(continued)*

Name of organisation developing framework	Framework	Type of framework	Notes on topics covered	Scope of applicability within mineral supply chain	Specific commodity (mineral and/or Products)
Financial Stability Board (FSB)	Task-Force on Climate Related Financial Disclosures (TCFD). Following the release of the Task Force's 2023 Status Report, upon request of the FSB, the TCFD has been disbanded.	Principle-Based Framework	In December 2015, the Financial Stability Board (FSB) established the industry-led Task Force on Climate-related Financial Disclosures (TCFD or Task Force) to develop climate-related disclosures that "could promote more informed investment, credit [or lending], and insurance underwriting decisions" and, in turn, "would enable stakeholders to understand better the concentrations of carbon-related assets in the financial sector and the financial system's exposures to climate-related risks.	Non-Sector Specific	Non-Specific
Global Reporting Initiative (GRI) Standards	Global Reporting Initiative (GRI)	Principle-Based Framework	The GRI Standards are a modular system of interconnected standards. They allow organizations to publicly report the impacts of their activities in a structured way that is transparent to stakeholders and other interested parties	Non-Sector Specific	Non-Specific
Initiative for Responsible Mining Assurance (IRMA)	The Standard for Responsible Mining V1	Performance/ Conformity Standard	The mission of the IRMA process is to protect people and the environment directly affected by mining. The initiative does this by creating financial value for mines independently verified to achieve best practices, and share this value with the businesses that purchase material from these mines.	Large-Scale Mining (LSM)	Multiple
International Council on Mining and Metals (ICMM)	Mining Principles	Principle-Based Framework	ICMM has principles for sustainable development to set a standard of ethical performance for their members. The principles are in the topics are: ethical business decision making, human rights, risk management, health and safety, environmental performance, conservation of biodiversity, responsible production, social performance, and stakeholder engagement.	Non-Sector Specific	Non-Specific
International Finance Corporation (IFC)/World Bank Group	IFC Performance Standards on Environmental and Social Sustainability	Performance/ Conformity Standard	IFC's Sustainability Framework articulates the Corporation's strategic commitment to sustainable development, and is an integral part of IFC's approach to risk management. The Sustainability Framework comprises IFC's Policy and Performance Standards on Environmental and Social Sustainability, and IFC's Access to Information Policy.	Non-Sector Specific	Non-Specific
International Financial Reporting Standards (IFRS) Foundation	IFRS S1 General Requirements for Disclosure of Sustainability-related Financial Information; IFRS S2 Climate-related Disclosures	Performance/ Conformity Standard	IFRS S1 provides a set of disclosure requirements designed to enable companies to communicate to investors about the sustainability-related risks and opportunities they face over the short, medium and long term. IFRS S2 sets out specific climate-related disclosures and is designed to be used with IFRS S1.	Non-Sector Specific	Non-Specific
International Sustainability Standards Board (ISSB)	Sustainability Accounting Standards Board (SASB) Standards	Performance/ Conformity Standard	SASB Standards enable organisations to provide industry-based disclosures about sustainability-related risks and opportunities that could reasonably be expected to affect the entity's cash flows, access to finance or cost of capital over the short, medium or long term.	Non-Sector Specific	Multiple
International Tin Association - Tin Code	Tin Code	Performance/ Conformity Standard	The Tin Code is an initiative launched by the International Tin Association (ITA) in 2018, showcasing our member's engagement and commitment to making progress and positive contributions in the areas of ESG and sustainability.	Multiple - ASM, Mineral Processing	Tin
ITSCI Joint Industry Traceability and Due Diligence Programme	The International Tin Supply Chain Initiative (ITSCI)	Supply Chain Due Diligence Standard	ITSCI's purpose is to create responsible mineral supply chains that avoid contributing to conflict, human rights abuses, or other risks such as bribery.	Multiple - LSM, ASM, Mineral Processing	Tin

Table A.1 *(continued)*

Name of organisation developing framework	Framework	Type of framework	Notes on topics covered	Scope of applicability within mineral supply chain	Specific commodity (mineral and/or Products)
Kimberley Process Certification Scheme (KPCS)	Kimberley Process	Supply Chain Due Diligence Standard	The Kimberley Process Certification Scheme (KPCS) imposes extensive requirements (*) on its members to enable them to certify shipments of rough diamonds as 'conflict-free' and prevent conflict diamonds from entering the legitimate trade.	Multiple - LSM, ASM	Diamonds
London Bullion Market Association (LBMA)	LBMA Responsible Gold Guidance International Bullion Centre Recommendations; Global Precious Metals Code	Supply Chain Due Diligence Standard	The London Bullion Market Association (LBMA) plays a significant role in setting standards and promoting best practices in the global precious metals market.	Multiple - LSM, ASM, Mineral Processing, Manufacturing	Precious Metals (Gold, Silver, Platinum, Palladium)
Responsible Cobalt Initiative (RCI), and the Responsible Minerals Initiative (RMI)	Cobalt Refiner Supply Chain Due Diligence Standard (Version 2)	Supply Chain Due Diligence Standard	A Standard to demonstrate due diligence for cobalt crude and fine refiner supply chain	Mineral Processing	Cobalt
Responsible Cobalt Initiative, the Global Battery Alliance's Cobalt Action Partnership, and the Fair Cobalt Alliance	Cobalt ASM ESG Management Framework	Supply Chain Due Diligence Standard	This document sets out the vision and approach to building the Artisanal and Small-Scale Mining (ASM) Cobalt ESG Management Framework ("ASM Cobalt Framework") that enables progressive improvements at artisanal cobalt mines in the Democratic Republic of the Congo (DRC).	Artisanal and Small-Scale Mining (ASM)	Cobalt
Responsible Jewellery Council (RJC)	RJC Code of Practices (COP) RJC Chain of Custody Standard (CoC); RJC Code of Practices (COP) Standard.	Supply Chain Due Diligence Standard	The RJC Code of Practices (COP) defines the responsible ethical, human rights, social and environmental practices that all certified RJC members must adhere to. This is a living document and the RJC reserves the right to revise it based on implementation experience and emerging good practice. The official language of the COP is English with translated versions available on the website. The English version posted on the RJC website supersedes all other versions; see www.responsiblejewellery.com	Multiple - LSM, ASM, Mineral Processing, Manufacturing	Multiple (Gold, Silver, PGM, Diamond and Coloured Gemstones)
Responsible Minerals Initiative (RMI)	Responsible Minerals Assurance Process (RMAP), Mineral Supply Chain Due Diligence (DD)	Supply Chain Due Diligence Standard	RMI/RMAP documentation includes two standards that are broadly focused - all minerals and the full supply chain. These are: (1) GLOBAL RESPONSIBLE SOURCING DUE DILIGENCE STANDARD FOR MINERAL SUPPLY CHAINS-ALL MINERALS (December 2021); and (2) RESPONSIBLE MINERALS ASSURANCE PROCESS - ENVIRONMENTAL, SOCIAL & GOVERNANCE (ESG) STANDARD FOR MINERAL SUPPLY CHAINS (June 2021)	Multiple - LSM, ASM, Mineral Processing, Manufacturing, Recycler	Multiple
Responsible Minerals Initiative (RMI)	Environmental, Social & Governance (ESG) Standard	Performance/ Conformity Standard	This standard sets forth the criteria for determining conformance with the RMI program requirements for environmental, social, health & safety, governance at mineral processing companies.	Multiple - LSM, ASM, Mineral Processing, Manufacturing, Recycler	Multiple
Responsible Steel	The ResponsibleSteel International Standard	Performance/ Conformity Standard	The ResponsibleSteel International Standard has been developed over the course of seven years to recognise, encourage and reward steel sites operating in an environmentally and socially responsible manner.	Multiple - Mineral Processing, Manufacturing	Steel
Task Force for Nature-related Financial Disclosure (TNFD)	Task Force for Nature-related Financial Disclosure (TNFD)	Principle-Based Framework	The Taskforce on Nature-related Financial Disclosures (TNFD) has developed a set of disclosure recommendations and guidance that encourage and enable business and finance to assess, report and act on their nature-related dependencies, impacts, risks and opportunities.	Non-Sector Specific	Non-Specific

Table A.1 *(continued)*

Name of organisation developing framework	Framework	Type of framework	Notes on topics covered	Scope of applicability within mineral supply chain	Specific commodity (mineral and/or Products)
The Copper Mark	The Copper Mark Assurance Framework	Performance/ Conformity Standard	The Copper Mark is an assurance framework to demonstrate the copper industry's responsible production practices and industry contribution to the United Nations SDGs. The Copper Mark Criteria for responsible production are the requirements defined in the Risk Readiness Assessment, including the criteria guide which provides a description of the performance determination and means of verification for each issue area.	Multiple - LSM, ASM, Mineral Processing, Manufacturing	Multiple
The Expert Group on Resource Management (EGRM)	United Nations Resource Management System (UNRMS)	Principle-Based Framework	The United Nations Resource Management System (UNRMS) is a comprehensive, sustainable natural resource management framework that supports the attainment of the 2030 Agenda for Sustainable Development.	Non-Sector Specific	Non-Specific
The International Cyanide Management Institute	International Cyanide Management Code	Performance/ Conformity Standard	The "International Cyanide Management Code For the Manufacture, Transport, and Use of Cyanide In the Production of Gold" (Cyanide Code) is a voluntary, performance driven, certification program of best practices for the management of cyanide in gold and silver mining.	Multiple - LSM, Mineral Processing	Gold, Silver
The Mining Association of Canada (MAC), Towards Sustainable Mining	Towards Sustainable Mining Standard	Performance/ Conformity Standard	TSM provides a set of tools and indicators that drive performance and ensures that key mining risks are managed responsibly at participating mining and metallurgical facilities. TSM's eight performance protocols focus on three core areas: Communities and People, Environmental Stewardship and Energy Efficiency.	Large-Scale Mining (LSM)	Multiple
The Organisation for Economic Co-operation and Development (OECD)	OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from CAHRAs	Principle-Based Framework	The OECD Due Diligence Guidance provides detailed recommendations to help companies respect human rights and avoid contributing to conflict through their mineral purchasing decisions and practices. This Guidance is for use by any company potentially sourcing minerals or metals from conflict-affected and high-risk areas. The OECD Guidance is global in scope and applies to all mineral supply chains.	Multiple - LSM, ASM, Mineral Processing	Multiple
United Nations Environment Programme (UNEP), the Principles for Responsible Investment (PRI) and the International Council on Mining and Metals (ICMM)	Global Industry Standard on Tailings Management (GISTM)	Performance/ Conformity Standard	The GISTM (Global Industry Standard on Tailings Management) standard is administered and updated by the Global Tailings Review, which is a collaboration between the United Nations Environment Programme (UNEP), Principles for Responsible Investment (PRI), and the International Council on Mining and Metals (ICMM). The aim of the GISTM standard is to set a global benchmark for the safe management of tailings facilities, focusing on environmental, social, and governance (ESG) aspects.	Large-Scale Mining (LSM)	Multiple
World Gold Council	Responsible Gold Mining Principles (RGMPs)	Performance/ Conformity Standard	The Responsible Gold Mining Principles (RGMPs) are a new framework that set out clear expectations for consumers, investors and the downstream gold supply chain as to what constitutes responsible gold mining.	Multiple - LSM, ASM	Gold