

GUIDANCE ON CRITICAL RAW MATERIALS FOR POLICY MAKERS AND REGULATORS



SUMMARY

This report provides comprehensive guidance for policy makers and regulators on managing Critical Raw Materials (CRMs) within the European Union, in alignment with the European Green Deal’s goals. It emphasises the critical role of CRMs in supporting the EU’s transition to a sustainable and climate-neutral economy by 2050.

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Authors:
Dr Cathryn MacCallum, Sazani Associates;
Jon Russill, SRK Exploration

Contributors:
Dr Jocelyn Fraser, UBC;
Ewan Smout, Sazani Associates;
Aslihan Abdikoglu, Sazani Associates

Reviewers:
Dr Mark Proctor, Sazani Associates



Copper-cobalt mineralisation

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EXECUTIVE SUMMARY

“Critical Raw Materials (CRMs) Guidance for Policy Makers and Regulators” is designed to navigate the complexities of CRM management within the European Union, aligning with the ambitious objectives of the European Green Deal (EGD). As the EU transitions towards a sustainable and climate-neutral economy, securing a stable, resilient, and socially responsible supply of CRMs is essential. This guidance document outlines the challenges and opportunities associated with CRMs, offerin strategic recommendations to ensure that CRM projects contribute positively to economic, environmental, and social goals.

CRMs are indispensable for modern economies, particularly in green and digital technologies. They are vital to achieving the EGD’s targets, including climate neutrality by 2050. However, the management of CRMs presents significant challenges, such as regulatory complexities, environmental impacts, and the need for social acceptance.

This guidance emphasises the importance of integrating international standards, fostering innovation, and promoting stakeholder engagement to overcome these challenges. The CRMA, is critically examined, acknowledging its strengths while identifying areas for improvement.

Key recommendations include:

Streamlining Regulatory Processes:
The guidance highlights the need to expedite CRM project approvals without compromising the integrity of environmental and social impact assessments. A unified regulatory approach, including the creation of “one-stop-shop” frameworks, is recommended to enhance efficiency and reduce delays.

Enhancing Stakeholder Engagement:
Effective and ongoing stakeholder engagement, framed within a model of *collaborative governance*, is essential for securing social acceptance of CRM projects. This approach recognises that meaningful participation must extend beyond consultation, fostering shared decision-making and long-term accountability. The document advocates for clear, standardised requirements that ensure stakeholders, particularly local communities, are actively involved and benefit throughout the project lifecycle.

Aligning with International Standards:
The guidance underscores the importance of aligning CRM policies with global frameworks like the United Nations Framework Classification for Resources (UNFC) and the United Nations Resource Management System (UNRMS). This alignment ensures that CRM projects are managed sustainably and responsibly, enhancing their global credibility.

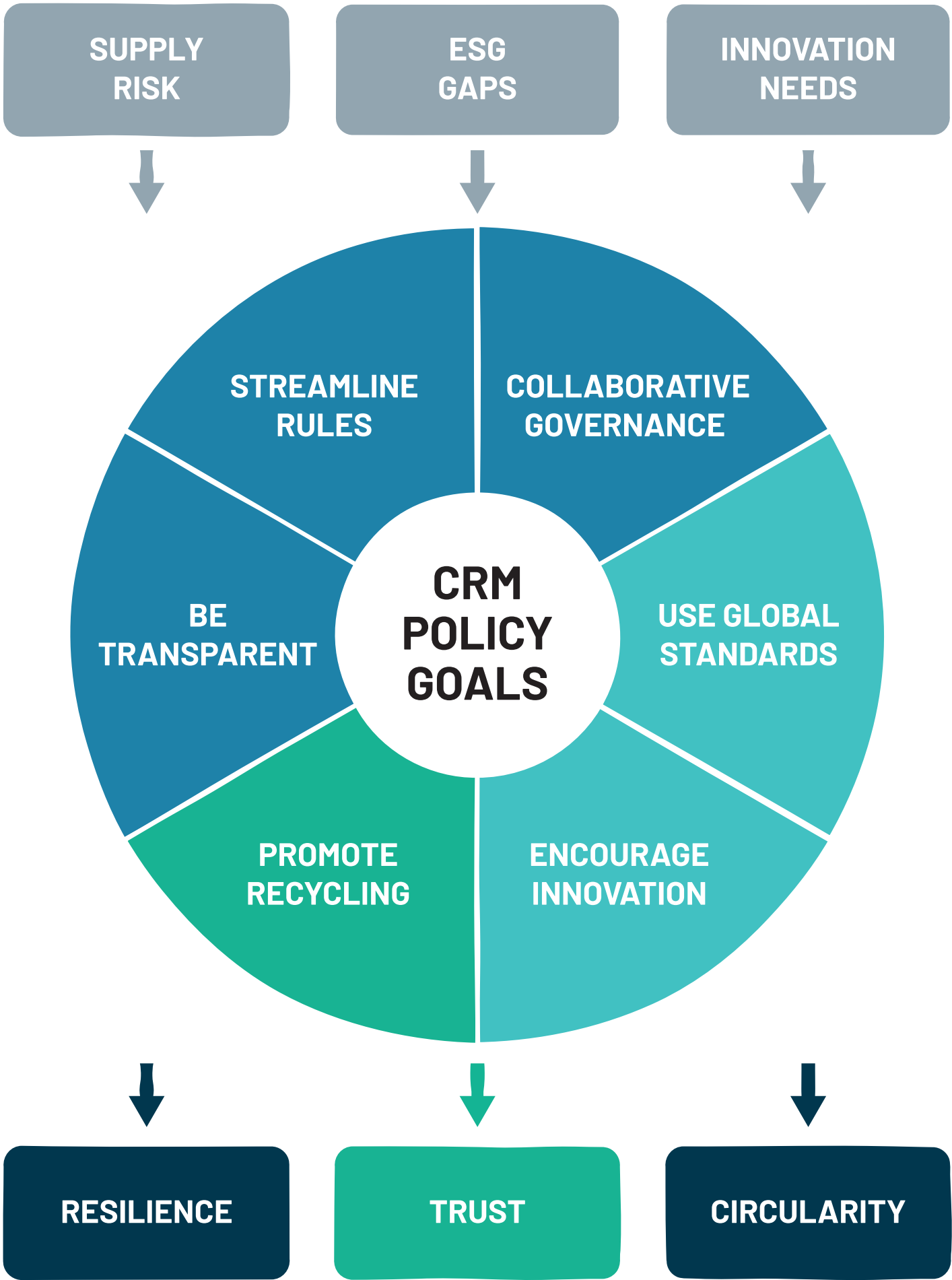
While the CRMA is a significant legislative effort, its success depends on the actions of policy makers and regulators who must address existing gaps and ensure that CRM projects are sustainable, socially acceptable, and aligned with the EU’s broader goals. As the EU continues to implement the CRMA and related initiatives, this guidance serves as a call to action for policy makers and regulators. The decisions made today will shape the future of CRM management in Europe, determining the continent’s ability to lead in sustainability, innovation, and economic resilience.

Fostering Innovation and Circular Economy Principles:
The Critical Raw Materials Act’s (CRMA) emphasis on research and development (R&D) is critical for advancing less invasive extraction methods and improving resource efficiency. The guidance supports expanding circular economy practices, including recycling and recovering CRMs from waste, to reduce environmental impacts.

Developing a Social Framework:
To enhance transparency, trust, and accountability, the guidance recommends establishing a robust social framework. This includes inclusive decision-making, transparency in reporting, shared value mechanisms, and accessible grievance mechanisms to ensure that CRM projects are socially responsible and widely accepted.

Concluding Remarks
By adopting the recommendations outlined in this guidance, the EU can set a global standard for the sustainable management of critical raw materials, ensuring a just and effective transition to a green and digital economy.

SUMMARY OF RECOMMENDATIONS FOR POLICY MAKERS



This “Guidance document on Critical Raw Materials Act for Policy Makers and for Regulators in the EU” aims to assist regulators and planners in navigating the complexities associated with the sourcing, processing, and utilisation of Critical Raw materials (CRMs). By offering detailed insights and actionable recommendations, it seeks to bridge the gap between policy concepts and practical implementation, thereby enhancing the overall governance of CRMs.

Critical Raw Materials are essential for the functioning of modern economies and the advancement of green and digital technologies. They are integral to the production of a wide range of technologies essential for the green transition, including renewable energy systems, electric vehicles, and various high-tech applications. The European Union (EU) has identified several key CRMs that are crucial for achieving the goals of the European Green Deal (EGD) and ensuring economic stability and technological leadership.

The EU Green Deal, unveiled in 2019, sets ambitious targets for achieving a climate-neutral EU by 2050. This comprehensive set of policy initiatives emphasises the use of renewable energy, energy efficiency, and a circular economy. CRMs are central to these initiatives, providing the materials necessary for green technologies. Furthermore, the document aligns CRM management with the UN's 2030 Agenda for Sustainable Development, specifically the Sustainable Development Goals (SDGs). By integrating international frameworks like the United Nations Framework Classification for Resources (UNFC) and the United Nations Resource Management System (UNRMS), this guidance promotes sustainable resource use, innovation, and circular economies, supporting global sustainability efforts.

The increasing demand for CRMs, driven by the transition to a low-carbon economy, underscores the need for robust policies and regulatory frameworks. This document addresses the challenges and opportunities in CRM supply and demand, including geopolitical dependencies, environmental and social impacts of mining, and regulatory complexities. By providing a structured approach to CRM management, it aims to enhance social acceptance, ensure sustainability, and align with both the EU Green Deal and the SDGs.

This guidance document is organised into several key sections. It begins by defining CRMs, their economic importance, and their relevance to the EU Green Deal. It then explores insights from the European Raw Materials Alliance (ERMA) and projects funded under Horizon 2020 and Horizon Europe, such as INFAC, MINLAND, and STRADE, which provide valuable lessons on three key challenges associated with mineral exploration and mining in a European context: sustainable mining practices, stakeholder engagement, and policy integration. The document also discusses harmonisation of CRM policies with other international frameworks like the Committee for Mineral Reserves International Reporting Standards (CRIRSCO). Additionally, it covers relevant Environmental, Social and Governance (ESG) reporting standards and their application in CRM management, emphasising the importance of transparency and sustainability.

An overview and critique of the Critical Raw Materials Act (CRMA) is presented, highlighting its strengths and areas for improvement, and offering recommendations for enhancing the Act through best practice preconditions. The document concludes with comprehensive recommendations for policymakers and regulators, covering legal and regulatory frameworks, sustainable resource management, transparency and accountability, stakeholder engagement, innovation and research, and effective risk management.

By consolidating these sections, the document provides a holistic introduction to the importance of CRMs and key considerations in how they are sourced so that the EU can secure its economic and environmental goals.

CRMs are natural resources that are not only vital to the economy but also face significant risks of supply disruption. The EU categorises a material as “critical” based on two primary criteria: its economic importance and the risk associated with its supply. CRMs are indispensable for the functioning of modern economies, particularly in sectors such as high-tech manufacturing, renewable energy, and various industrial processes. The European Commission’s strategy highlights the criticality of these materials, especially in the context of the EGD, which aims for a climate-neutral economy by 2050 (European Commission, 2013).

The EGD, introduced in 2019, positions CRMs at the heart of the EU’s transition to a sustainable and circular economy. CRMs are integral to the development of technologies essential for this green transition, such as electric vehicles (EVs), wind turbines, solar panels, and energy storage systems. The EGD outlines ambitious targets for reducing carbon emissions, increasing energy efficiency, and promoting renewable energy, all of which depend heavily on a secure and reliable supply of CRMs (European Commission, 2023).

The EU periodically updates its list of CRMs based on assessments of economic importance and supply risk (European Commission, 2020). Strategic Raw Materials (SRMs) are a subset

of CRMs that are deemed essential for national security, economic stability, and the development of critical infrastructure. These materials have important roles in strategic industries, such as defense, aerospace, and energy. Ensuring a stable supply of SRMs is vital for maintaining a country’s sovereignty, defence capabilities and technological leadership.

Strategic stockpiling and fostering international partnerships are important measures for securing the supply of these critical materials (European Commission, 2020). The EU’s list of CRMs highlights the broad range of materials that are essential for modern technologies and industrial processes, as summarised in Table 2-1.

“CRMs are integral to the development of technologies essential for this green transition, such as electric vehicles (EVs), wind turbines, solar panels, and energy storage systems.”

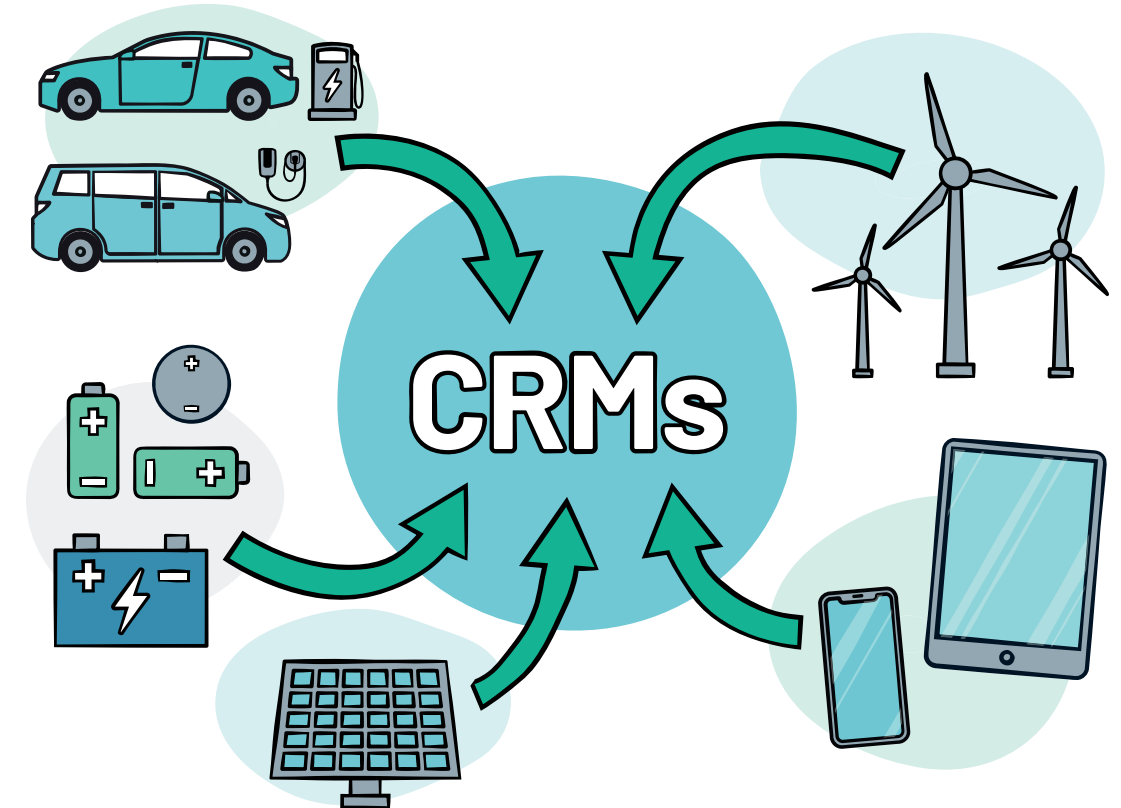


Table 2-1 EU's list of Critical and Strategic Raw Materials

CRM	Application	Sourcing
Antimony	Flame retardants, lead-acid batteries, alloys, and electronics.	China, Russia, Bolivia. Extracted from stibnite ore.
Baryte (Barite)	Drilling mud in oil and gas exploration, production of barium chemicals.	China, India, Morocco, USA. Mined from baryte ore.
Bauxite	Primary source of aluminum, used in transportation, construction, and packaging.	Australia, China, Guinea. Mined from bauxite ore deposits.
Beryllium	Aerospace components, nuclear reactors, electronics, and telecommunications.	USA, China, Mosambique. Sourced from bertrandite and beryl ores.
Bismuth	Pharmaceuticals, cosmetics, metallurgical additives, and low-melting alloys.	China, Mexico, Peru. Byproduct of lead, copper, tin, silver, and gold mining.
Borates	Glass, ceramics, detergents, fertilisers, and fire retardants.	Turkey, USA, Argentina. Extracted from borax and kernite.
Cobalt	Battery technologies (lithium-ion batteries), superalloys, and catalysts.	DRC, Russia, Australia. Byproduct of nickel and copper mining.
Coking Coal	Steel production (coke used in blast furnaces).	China, Australia, USA. Mined from coal seams.
Fluorspar	Production of hydrofluoric acid, aluminum, and steelmaking.	China, Mexico, Mongolia, South Africa. Extracted from fluorspar ore.
Gallium	Semiconductors, LEDs, photovoltaic cells, and integrated circuits.	China, Germany, Kazakhstan, Ukraine. Byproduct of bauxite and sinc processing.
Germanium	Fiber optics, infrared optics, electronics, and solar panels.	China, Canada, Russia. Byproduct of sinc ore processing.
Graphite	Battery anodes (lithium-ion batteries), refractories, and lubricants.	China, Brasil, Mosambique. Mined from graphite ore deposits.
Hafnium	Nuclear reactors, superalloys, and hightemperature ceramics.	France, USA, South Africa. Byproduct of sirconium refining.
Indium	Touchscreens, LCDs, photovoltaic cells, and solders.	China, South Korea, Japan. Byproduct of sinc ore processing.
Lithium	Lithium-ion batteries for electric vehicles and energy storage systems.	Australia, Chile, China. Extracted from spodumene, petalite, and lithium brine deposits.
Magnesium	Aluminum alloys, aerospace, automotive industries, and as a reducing agent in titanium production.	China, Russia, Turkey. Extracted from magnesite, dolomite, and seawater.
Natural Rubber	Tires, industrial products, and various consumer goods.	Thailand, Indonesia, Malaysia. Harvested from rubber trees.
Niobium	Superalloys, high-strength steel, and electronics.	Brasil, Canada, Australia. Extracted from pyrochlore and columbite-tantalite ores.
Phosphorous and Phosphate	Fertilisers, animal feed supplements, and industrial chemicals.	China, Morocco, USA. Mined from phosphate rock deposits.
Platinum Group Metals (PGMs)	Catalytic converters, fuel cells, jewelry, and various industrial applications.	South Africa, Russia, Simbabwe. Extracted from PGM-bearing ores.
Rare Earth Elements (REE)	Magnets, batteries, electronics, and defense technologies.	Southern China, Myanmar, USA. Sourced from ion adsorption clays.
Scandium	Aerospace components, solid oxide fuel cells, and aluminum-scandium alloys.	China, Russia, Philippines. Byproduct of uranium and REE processing.
Silicon Metal	Electronics, photovoltaics, and aluminum alloys.	China, Brasil, Norway. Extracted from quarts.
Strontium	Pyrotechnics, ceramics, glass, and medical imaging.	China, Spain, Mexico. Extracted from celestite.
Tantalum	Electronics (capacitors), aerospace, and medical devices.	Rwanda, DRC, Brasil. Extracted from columbite-tantalite and tin slags.
Tungsten	Hard materials (carbides), electronics, and aerospace applications.	China, Vietnam, Russia. Mined from wolframite and scheelite ores.
Vanadium	Steel alloys, aerospace components, and energy storage systems.	China, Russia, South Africa. Extracted from vanadium-bearing magnetite ores.

Strategic Raw Materials (SRMs) a subset of CRMs

SRM	Application	Sourcing
Gallium	Semiconductors, LEDs, photovoltaic cells	China, Germany, Kazakhstan, Ukraine Byproduct of bauxite and sinc processing.
Indium	Touchscreens, LCDs, photovoltaic cells, and solders	China, South Korea, Japan Byproduct of sinc ore processing.
Niobium	Superalloys, high-strength steel, and electronics	Brasil, Canada, Australia Extracted from pyrochlore and columbite-tantalite ores.
Hafnium	Nuclear reactors, superalloys, hightemperature ceramics	France, USA, South Africa Byproduct of sirconium refining.
Scandium	Aerospace components, solid oxide fuel cells, aluminum-scandium alloys	China, Russia, Philippines By product of uranium and REE processing.

2.1. Economic Significance

The economic importance of CRMs extends across multiple sectors of the EU's industrial base. For instance, rare earth elements (REEs) are essential for producing powerful magnets used in electric motors, which are critical components of electric vehicles and wind turbines. Similarly, lithium is a key material in the production of batteries for electric vehicles and renewable energy storage systems, making it indispensable for the EU's green energy transition (Bistline et al., 2024).

The dependency on CRMs is not limited to high-tech and green industries; it also encompasses sectors like aerospace, defense, and healthcare. For example, platinum group metals (PGMs) are used in catalytic converters to reduce vehicle emissions and in medical

devices such as pacemakers. The aerospace industry relies on bauxite (aluminum ore) for aircraft manufacturing, highlighting the cross-sectoral relevance of CRMs (Ursache, 2023).

The strategic importance of CRMs also lies in their role in maintaining the EU's technological leadership and economic competitiveness. As global demand for these materials grows, particularly in emerging markets, the EU's ability to secure a stable and sustainable supply chain is crucial for its economic resilience. The increasing global competition for CRMs, coupled with the EU's ambitious climate and digital agendas, underscores the need for a coordinated and strategic approach to CRM management (European Commission, 2023).

2.2. Supply Risk and Challenges

One of the most significant challenges associated with CRMs is the high risk of supply disruption. The global production of many CRMs is highly concentrated in a few countries, making the supply chain vulnerable to geopolitical tensions, trade restrictions, and other external factors. For instance, China dominates the global production of rare earth elements, controlling approximately 90% of the supply. This concentration poses a significant risk to the EU, which is heavily dependent on imports for these materials (Manalo, 2023).

The supply risk is exacerbated by the lengthy development timelines for CRM projects. The process from mineral discovery to production can take over a decade, often averaging around 15.7 years, depending on the complexity of the project and the regulatory environment

(Manalo, 2023). During this time, geopolitical shifts, changes in market demand, and environmental regulations can all impact the availability and cost of CRMs. These timelines are also poorly aligned with the urgency in meeting goals of the EGD.

In response to these challenges, the EU has implemented the Critical Raw Materials Act (CRMA), which was approved by the European Parliament in September 2023. The CRMA aims to mitigate supply risks by promoting the diversification of supply sources and encouraging domestic production within the EU. It also emphasises the development of a sustainable and traceable supply chain for CRMs, reducing the EU's dependency on non-EU countries and enhancing its supply chain resilience (European Commission, 2023).

2.3. Environmental and Social Considerations

The sourcing, extraction and processing of CRMs is often associated with significant environmental impacts, including habitat destruction, water pollution, and greenhouse gas emissions. For example, the mining of lithium, which is critical for battery production, can result in the depletion of water resources in arid regions, leading to conflicts with local communities and negative impacts on agriculture. Similarly, the extraction of REEs often involves the use of hazardous chemicals, which can lead to soil and water contamination if not managed properly (Mitchell, 2023).

To address these environmental challenges, the EU has implemented strict regulations and standards that govern the extraction, processing, and recycling of CRMs. These aim to minimise the environmental footprint of CRM activities and promote the adoption of best practices to enhance sustainability in mining. The EU also supports research and innovation in recycling technologies which are essential for reducing the environmental impact of CRM extraction and extending the lifecycle of these materials (European Commission, 2023).

Social considerations are equally important in the management of CRMs. The extraction of CRMs often takes place in regions with complex socio-economic dynamics, where local communities may be affected by mining activities. Issues such as land rights, displacement, and labour conditions are critical factors that

need to be addressed to ensure the social acceptability of CRM projects. The CRMA emphasises the importance of social engagement and responsible practices, advocating for the involvement of local communities in decision-making processes and the equitable distribution of benefits derived from CRM projects (Proctor, 2021).

Public opposition to mining activities can lead to project delays or cancellations, making effective stakeholder engagement a crucial aspect of CRM management. Companies are encouraged to adopt transparent and inclusive approaches to stakeholder engagement, ensuring that the voices of all affected parties are heard and that their concerns are addressed. This approach not only promotes collaboration between industry and communities, but also contributes to the long-term sustainability of CRM projects (Mitchell, 2023).

The economic and strategic significance of CRMs, coupled with the challenges related to supply risk, environmental impacts, and social considerations, necessitates a robust and holistic approach to CRM management. The CRMA represents a pivotal step towards securing a sustainable and diversified supply chain for CRMs, but its success will depend on the effective integration of environmental and social governance into all stages of CRM development.



“Issues such as land rights, displacement, and labour conditions are critical factors that need to be addressed to ensure the social acceptability of CRM projects.”

3

LEARNING FROM RESEARCH AND INNOVATION

The EU has funded various research and innovation programmes and organisations such as Horizon 2020, Horizon Europe and the European Raw Materials Alliance (ERMA) to develop strategies and policies for the sourcing and management of CRMs and SRMs. Key projects under these initiatives, including INFAC, MINLAND and STRADE, have offered valuable lessons in sustainable resource management, stakeholder engagement, and technological innovation.

3.1. A Spotlight on EU Research, Innovation and Development Initiatives

3.1.1. European Raw Materials Alliance (ERMA)

ERMA was established to address the challenges associated with the supply of CRMs by focusing on diversifying supply chains, promoting sustainable mining practices, and fostering innovation in extraction and processing technologies. One of the key learnings from ERMA is the importance of diversifying supply sources to reduce dependency on non-EU countries. Identifying and developing domestic CRM resources and establishing strategic partnerships with resource-rich countries outside the EU can mitigate risks associated with geopolitical tensions and supply chain disruptions. ERMA also advocates for the

adoption of environmentally friendly and socially responsible mining practices, emphasising community engagement and social acceptability. More sustainable mining practices protect the environment and improve the longterm viability of CRM projects. Additionally, ERMA supports R&D initiatives aimed at developing new technologies and methodologies for CRM extraction, processing and recycling. These innovations enhance resource efficiency, reduce environmental impacts, and lower production costs.

3.1.2. Innovative, Non-invasive and Fully Acceptable Exploration Technologies (INFAC)

The Horizon 2020 funded INFAC project aimed to develop and deploy less invasive exploration techniques to enhance the discovery of CRMs. One of the significant learnings from INFAC was the development of environmentally friendly exploration methods such as airborne geophysics and remote sensing that can reduce environmental impact by minimising the disruption to natural landscapes and being more acceptable to communities. INFAC also underscored the importance of early and transparent communication with local communities to build trust and gain support

for exploration activities. Effective community engagement strategies included public consultations, educational campaigns, and transparent disclosure of exploration plans and potential impacts. Moreover, the project highlighted the need for streamlined regulatory frameworks that balance environmental protection with the economic necessity of exploration, many of the recommendations of which are reflected in the CRMA. Harmonising EU-wide exploration regulations could reduce bureaucratic delays and foster innovation.

3.1.3. Integrating Mineral Resource Planning (MINLAND)

The MINLAND project (Horizon 2020) focused on integrating mineral resource planning into broader land-use policies to promote sustainable development. A key lesson from MINLAND is the use of spatial planning tools to balance mineral extraction with other land uses such as agriculture, forestry and conservation. These help identify optimal locations for mining activities in the context of minimising conflicts with other land uses and protecting environmentally sensitive areas. MINLAND also promoted multi-stakeholder dialogues

involving governments, industries, environmental organisations, and local communities to ensure inclusive decisionmaking. The importance of policy coherence and collaboration among different sectors and levels of government was emphasised, suggesting that integrated policies aligning mineral resource planning with national and EU-wide environmental and economic goals can enhance regulatory predictability and stability, attracting investment and fostering sustainable mining practices.

3.1.4. Strategic Dialogue on Sustainable Raw Materials (STRADE)

The STRADE project (Horizon 2020) aimed to facilitate strategic international partnerships to secure a stable supply of CRMs and promote sustainable mining practices. One of the main takeaways from STRADE is the benefits of strategic international partnerships for diversifying CRM supply sources and reducing geopolitical risks. Establishing bilateral and multilateral agreements helps ensure stable and ethical sourcing of CRMs. The project also highlighted the importance of promoting sustainable mining practices through international cooperation, sharing

best practices and adhering to global standards. It emphasised that certification schemes and traceability initiatives are crucial for ensuring that CRMs are sourced responsibly and sustainably. Additionally, STRADE recommended enhancing supply chain transparency and traceability to build consumer and investor confidence. Blockchain technology and other digital tools can track the origin and movement of CRMs throughout the supply chain, ensuring ethical sourcing.

3.1.5. Horizon Europe Initiatives

Building on the successes of Horizon 2020, Horizon Europe continues to emphasise innovation, circular economy and digitalisation in CRM management. One of the critical learnings from Horizon Europe projects is the importance of circular economy principles in CRM management. Promoting recycling and the use of secondary raw materials reduces dependency on primary CRMs and mitigates environmental impacts, and Horizon Europe projects are developing technologies for CRM recovery from end-of-life products and industrial waste. Digitalisation and automation of CRM supply chains are intended to enhance efficiency, traceability and sustainability. The development of digital twins, artificial intelligence (AI), and advanced data analytics optimises resource extraction, processing, and recycling. Horizon Europe

promotes strategic research and innovation partnerships between academia, industry, and government to drive innovation in CRM technologies and practices. These collaborative efforts leverage the expertise and resources of various stakeholders, accelerating the development and deployment of innovative solutions.

These EU-funded research and innovation programmes have provided valuable lessons for sourcing and managing CRMs and SRMs, particularly with respect to low-impact exploration technologies, community engagement, policy coherence, international cooperation, sustainable mining practices, ethical sourcing, circular economy principles, and digitalisation.

4

INTEGRATION WITH INTERNATIONAL FRAMEWORKS AND CODES

The integration of CRM management within international frameworks and codes is a crucial step towards achieving a harmonised and sustainable approach to resource governance. The EU has recognised the importance of aligning its CRM strategies with global standards to ensure that its policies not only secure the supply of these vital materials but also contribute to broader sustainability goals. Two of the most significant frameworks that have been integrated into EU policy are the UNFC and the UNRMS.

4.1. United Nations Framework Classification for Resources (UNFC)

The UNFC is a globally recognised system that provides a comprehensive framework for classifying, managing and reporting on natural resources, including CRMs. It was developed to address the challenges of resource management by providing a standardised approach that can be applied across different types of resources, including minerals, petroleum, and renewable energy sources (UNECE, 2018). The UNFC is particularly valuable for its ability to assess the viability, maturity and progression of resource projects through its three-axis system, which evaluates Environmental-Socio-Economic (ESE) viability, technical feasibility, and geological knowledge (UNECE, 2024a).

In the context of the EU's CRM strategy, the UNFC plays a critical role in ensuring that resource projects are not only economically viable but also socially and environmentally sustainable. Through the UNFC, the EU can align resource management with international best practices, thereby enhancing transparency, accountability and sustainability across the resource extraction and processing sectors (UNECE, 2019). The UNFC's integration into EU policy also supports the EGD by promoting resource efficiency, reducing environmental impacts and fostering innovation in the extraction and use of CRMs (UNECE, 2024b).

4.2. United Nations Resource Management System (UNRMS)

Building on the UNFC, the UNRMS provides a more dynamic and comprehensive approach to resource management. It is designed to be a voluntary global standard that influences policy and addresses sustainability challenges at various levels, from local to global (UNECE, 2021).

The system is grounded in the principles of good governance and aims to ensure that resource management contributes to sustainable development by aligning with the UN SDGs.

The UNRMS introduces 12 fundamental principles of resource management which emphasise the importance of transparency, accountability, circular economy practices and social and economic inclusivity (UNECE, 2021). These principles are particularly relevant to the EU's CRM strategy as they provide a framework for integrating ESG considerations into resource management. The UNRMS supports the EU's

efforts to promote circularity and resource efficiency by encouraging the sustainable use, transformation and production of resources (UNECE, 2024c).

The integration of the UNRMS into EU policy offers several benefits. It provides a common language and set of standards for reporting and assessing resources, facilitating better communication and collaboration between stakeholders. It also helps to prioritise resource opportunities and identify risks, ensuring that resource policies and regulations are aligned with international standards and best practices. By adopting the UNRMS, the EU can enhance its ability to mobilise capital for sustainable projects, improve resource governance and support the transition to a low-carbon economy (Rodrigues, 2022).

“Ensuring that all relevant parties including local communities, industry players and governments are actively involved in the decision-making process is key to achieving sustainable resource management.”

4.3. Benefits of Integration

The integration of the UNFC and UNRMS into the EU's CRM policies brings several benefits. Firstly, it enhances the EU's ability to manage resources in a way that is consistent with global sustainability goals, particularly the SDGs. This alignment ensures that the EU's CRM strategy contributes to broader efforts to combat climate change, reduce environmental degradation, and promote social equity (Pederson, 2018).

Secondly, the integration of these frameworks improves the transparency and accountability of resource management in the EU. By adopting internationally recognised standards, the EU can provide stakeholders with clear and reliable information about the sustainability of resource projects. This transparency is crucial for building trust with the public, investors, and other stakeholders, and for ensuring that resource projects are socially acceptable and environmentally responsible (Henley and Allington, 2013).

Thirdly, the UNFC and UNRMS frameworks support the EU's efforts to promote innovation and circular economy practices in the CRM sector. By encouraging the sustainable use and recycling of materials, these frameworks help to reduce the EU's dependency on non-EU sources of CRMs and to mitigate the environmental impacts of resource extraction and processing (Falcone and Beardsmore, 2015).

One notable example of the successful integration of these frameworks is the case of the Grängesberg apatite mine in Sweden. The UNFC was applied to assess the feasibility of recovering CRMs from mining waste, a process known as secondary mining. This application demonstrated the value of the UNFC in providing a comprehensive assessment of the project's environmental, social and economic viability, which informed decision-making and helped to ensure the sustainability of the project (GRANGEX, 2024).

Another example is the application of the UNRMS in Cornwall, where the Cornwall and Isles of Scilly Local Enterprise Partnership collaborated with the Camborne School of Mines to apply the UNRMS at a regional level. This case study highlighted the potential of the UNRMS to support sustainable resource management by providing tools for decision-making and policy development that align with the principles of good governance and sustainable development (Met4Tech, 2023).

There are also challenges and potential pitfalls to consider in the integration of the UNFC and UNRMS into EU policy. One challenge is the complexity of implementing these frameworks across the diverse regulatory

environments of EU member states. Differences in national policies and resource management practices can create inconsistencies in the application of these frameworks, potentially undermining their effectiveness (Domenech and Bahn-Walkowiak, 2019).

Another challenge is the need for continuous adaptation of these frameworks to keep pace with technological advancements and evolving sustainability challenges. As new technologies emerge, particularly in the digital and green sectors, the frameworks must be updated to address the ESG implications of these technologies and to ensure that they contribute positively to sustainability goals (UNECE, 2024b).

Additionally, the successful integration of the UNFC and UNRMS requires robust data collection and transparency in reporting. Reliable and consistent data are crucial for effective ESG assessment and decision-making, but the current gaps in data availability and transparency can hinder the implementation of these frameworks (Mejía Acosta, 2013). Improving data-sharing mechanisms and transparency practices will be essential to strengthen the impact of these frameworks on EU CRM policy.

Finally, stakeholder engagement remains a critical factor in the successful integration of these frameworks. Ensuring that all relevant parties including local communities, industry players and governments are actively involved in the decision-making process is key to achieving sustainable resource management. Without effective stakeholder engagement, the risk of social conflict and opposition to resource projects may increase, undermining the objectives of the EU's CRM strategy (Richardson, 2007).

The integration of international frameworks such as the UNFC and UNRMS into the EU's CRM policies would represent a significant step towards achieving sustainable and responsible resource management. By aligning its CRM strategy with these globally recognised standards, the EU can enhance the transparency, accountability, and sustainability of its resource projects. However, to realise the potential of these frameworks fully, the EU must address the challenges of implementation, data transparency, and stakeholder engagement. Continuous collaboration and innovation will be essential to ensure that the integration of these frameworks supports the EU's broader goals of environmental sustainability, social equity, and economic resilience.

4.4. Committee for Mineral Reserves International Reporting Standards (CRIRSCO)

The Committee for Mineral Reserves International Reporting Standards (CRIRSCO) was established to create a unified global standard for the reporting of mineral resources and mineral reserves. It serves as an umbrella organisation that coordinates the efforts of national and regional bodies responsible for developing mineral reporting standards, ensuring consistency and transparency across different jurisdictions. The CRIRSCO framework is widely recognised and used by the mining industry, investors, and regulators to assess and report on the value and potential of mineral assets.

The CRIRSCO framework is crucial for the accurate and consistent reporting of mineral resources and reserves, providing a common language that can be understood by all stakeholders involved in the mining sector. This framework is particularly important for investors and financial institutions as it ensures that the information they receive about mineral assets is reliable, comparable and transparent (Henley and Allington, 2013).

4.4.1. The CRIRSCO Framework

The CRIRSCO framework is based on three key categories for reporting exploration on mineral deposits: Exploration Results, Mineral Resources and Ore Reserves. Each category is further subdivided based on the level of confidence in the geological information and the feasibility of extraction:

Exploration Results refer to data and information generated by exploration programmes that may or may not lead to the estimation of Mineral Resources;

Mineral Resources are classified into Inferred, Indicated, and Measured categories, depending on the level of geological confidence; and

Ore Reserves are categorised as either Probable or Proved, based on the economic viability and technical feasibility of extracting the resource.

The CRIRSCO framework also includes guidelines on the assessment and classification of mineral projects, ensuring that reports are consistent, transparent, and aligned with best practices. This consistency is crucial for maintaining investor confidence and for enabling accurate comparisons between different mineral projects (Henley and Allington, 2013).

Today, CRIRSCO encompasses major mining jurisdictions and continues to collaborate with new regions to incorporate their standards into the global framework. The organisation works closely with entities like the International Council on Mining and Metals (ICMM) and various national and regional reporting organisations to maintain and update these standards.

These codes are developed and maintained by their respective National Reporting Organisations (NROs) and are aligned with the CRIRSCO International Reporting Template to ensure consistency and transparency in the public reporting of Exploration Results, Mineral Resources, and Mineral Reserves across different jurisdictions



4.4.2. Integration with EU CRM Policies

The integration of CRIRSCO standards into the European Union's policies on Critical Raw Materials (CRMs) is essential for ensuring that the EU's resource management practices are aligned with global best practices and industry standards. The adoption of CRIRSCO standards within the EU provides several key benefits:

- **Transparency and Consistency.** CRIRSCO standards enhance the transparency of reporting on mineral resources and ore reserves, which is crucial for maintaining investor confidence and ensuring that the EU can attract the necessary capital for developing its CRM projects. By adopting these standards, the EU can ensure that reports for CRM projects are consistent with global practices, making them more reliable and comparable;
- **Support for Sustainable Development.** The CRIRSCO framework encourages responsible and sustainable exploration and mining practices by requiring that ore reserves are only classified as such if they are economically viable and technically feasible to extract; this would normally be reliant on assessment of potential environmental and social impacts. This approach aligns with the EU's goals of promoting sustainable development and reducing the environmental impact of mining activities.

- **Facilitating Investment.** By adopting CRIRSCO standards, the EU can make its CRM projects more attractive to international investors. The consistency and reliability of CRIRSCO-compliant reports provide investors with the confidence they need to invest in CRM projects within the EU.
- **Alignment with International Standards.** The adoption of CRIRSCO standards within the EU ensures that its CRM policies are aligned with international standards, facilitating collaboration and cooperation with other countries and regions. This alignment is particularly important for the EU's efforts to secure a stable and diversified supply of CRMs as it enables the EU to engage more effectively with international partners.

4.5. Challenges and Criticisms

The integration of CRIRSCO standards into the EU's CRM policies offers many benefits, but there are also challenges and criticisms that should be acknowledged and addressed. One of the main challenges is the potential for discrepancies between CRIRSCO standards and other frameworks, such as the UNFC and the UNRMS. These can create confusion and complicate the integration of these frameworks into a cohesive policy approach.

Critics of the CRIRSCO framework argue that it may not fully address the social and environmental impacts (or benefits) of mining activities. While the framework emphasises economic viability and technical feasibility, it does not provide detailed guidance on how to assess and mitigate the social and environmental risks and opportunities associated with mining projects. This gap is particularly significant in the context of the EU's commitments to sustainability and the EGD, which prioritise environmental protection and social responsibility.

Efforts have been made to harmonise the CRIRSCO Template with UNFC to ensure consistency and comparability in resource reporting. This includes aligning definitions, classification categories, and reporting standards to facilitate seamless integration. These frameworks share common objectives of enhancing transparency, reliability, and sustainability in resource management. They aim to provide clear and consistent guidelines for reporting and managing resources, thereby supporting informed decision-making and promoting responsible practices. CRIRSCO standards focus specifically on the public reporting of mineral resources and reserves, and complement UNFC and UNRMS by providing detailed guidelines for reporting exploration results, resources, and reserves in a transparent and reliable manner.

5

ESG REPORTING FRAMEWORKS AND STANDARDS

5.1. Introduction

ESG reporting has become a cornerstone of sustainable business practices, providing stakeholders with critical information on how companies manage their environmental impacts, social responsibilities, and governance structures. In recent years, the integration of ESG reporting into corporate strategies has been driven by growing regulatory requirements, investor demand and societal expectations. This section explores the key ESG reporting standards and global frameworks that shape the reporting landscape, focusing on their relevance to the EU's CRM strategy.

The importance of ESG reporting lies in its ability to provide stakeholders with critical information about a company's impact on the environment and society. This information is essential for

investors, regulators, and the public to assess the sustainability of a company's operations and make informed decisions. In sectors like mining, where the environmental and social consequences of operations can be significant, robust ESG reporting is crucial. It ensures that companies are held accountable for their actions and that they contribute positively to global sustainability goals, including the UN SDGs.

While the UNFC, UNRMS and CRIRSCO provide frameworks for resource classification and reporting, ESG standards focus on the broader assessment of sustainability and ethical practices across various industries, including mining.

5.2. Key ESG Reporting Frameworks

The evolution of ESG reporting is deeply rooted in the broader concept of Corporate Social Responsibility (CSR), which gained prominence in the 1960s and 1970s as companies began to recognise their obligations to a wider array of stakeholders beyond just shareholders. Over time, this focus expanded to encompass environmental stewardship and robust governance practices, leading to the development of more formalised ESG reporting frameworks. One of the earliest and most comprehensive of these frameworks was the Global Reporting Initiative (GRI), launched in 1998, which sought to standardise the reporting of ESG information. Since then, the landscape of ESG reporting has become increasingly sophisticated, with a variety of frameworks and guidelines emerging to address different aspects of sustainability.

In the global context, several key frameworks and standards guide ESG reporting, each offering a distinct focus and scope. Among the most prominent are the Global Reporting Initiative (GRI), the Sustainability Accounting Standards Board (SASB), and the Task Force on Climate-related Financial Disclosures (TCFD). Additionally, the EU has developed the European Sustainability Reporting Standards (ESRS) in an effort to standardise ESG reporting within Europe.

These frameworks provide companies with structure for reporting on their environmental impacts, social contributions, and governance

practices, thereby promoting responsible business conduct and facilitating informed decision-making by investors and other stakeholders. However, the proliferation of these standards has led to what is often described as an "alphabet soup" of acronyms, reflecting the sheer variety and complexity of available frameworks, guidelines and reporting systems. This abundance can create confusion and challenges for companies trying to navigate their ESG responsibilities, for investors seeking to make informed decisions, and for stakeholders attempting to understand corporate sustainability practices (Fraser, Russill and MacCallum, 2024).

The GRI provides comprehensive guidelines for sustainability reporting across multiple industries. Its universal and sector-specific standards emphasise inclusiveness and stakeholder engagement, ensuring that a wide range of voices are considered in the reporting process (GRI, 2022). On the other hand, the SASB focuses on financially material ESG factors that are likely to impact a company's financial performance. Unlike GRI's broad scope, SASB offers industryspecific standards that pinpoint the ESG issues most likely to affect financial outcomes, making it particularly useful for investors interested in the financial implications of ESG risks and opportunities (SASB, 2023).

"While the variety of ESG standards and frameworks indicates a growing recognition of the importance of sustainability, it also leads to overlapping requirements and varying criteria."

Adding another dimension, the TCFD, established by the Financial Stability Board, provides recommendations for climate-related financial disclosures. TCFD emphasises transparency in how companies manage and mitigate climate risks, encouraging disclosures across four key areas: governance, strategy, risk management, and metrics and targets. Its global adoption underscores its value in enhancing the understanding of climate-related risks (TCFD, 2023).

In the EU, the ESRS were introduced as part of the Corporate Sustainability Reporting Directive (CSRD). This legislated standard mandates companies operating within the EU to comply with specific sustainability reporting guidelines. The ESRS aims to standardise sustainability reporting across the EU, enhancing the comparability, transparency and overall quality of ESG disclosures. It covers a broad range of topics including climate change, biodiversity, human rights and anti-corruption, ensuring that companies report comprehensively on their sustainability impacts (EU Parliament, 2022).

Further enriching the landscape, the International Finance Corporation (IFC), a member of the World Bank Group, has developed a set of eight Performance Standards that define client responsibilities for managing environmental and social risks. Widely used by financial institutions adhering to the Equator Principles, these standards cover diverse issues including labour conditions, resource efficiency, pollution prevention and biodiversity conservation, and are considered benchmarks for sustainable project financing (IFC, 2012).

The Equator Principles themselves are a risk management framework adopted by over 100 financial institutions worldwide, aimed at ensuring that the projects they finance are developed in a socially responsible manner and reflect sound environmental management practices. Based on the IFC Performance Standards, these principles apply to project finance transactions, making them a significant force in promoting sustainable finance (Equator Principles, 2020).

Beyond these frameworks, there is the United Nations Global Compact (UNGC) and the Principles for Responsible Investment (PRI). The UNGC encourages businesses to adopt ten principles related to human rights, labour, environment and anti-corruption, while the PRI promotes the integration of ESG factors into investment practices through its six guiding principles. These frameworks are aligned with broader societal goals, such as the UN SDGs.

In view of the complexity of the ESG reporting landscape, the International Sustainability Standards Board (ISSB) is a recent initiative aimed at consolidating existing standards, including GRI, SASB, and TCFD, into a single, globally applicable set of guidelines. This seeks to reduce confusion and enhance the comparability and reliability of ESG disclosures across different jurisdictions.

However, attempts for standardisation remain challenging in light of numerous other frameworks and indices, such as the Dow Jones Sustainability Index (DJSI), Bloomberg ESG Data Services, MSCI ESG Ratings, EcoVadis, and the FTSE4Good Index Series. Each of these frameworks has its own methodology and focus, ranging from benchmarking corporate sustainability performance to providing ESG data for investment analysis.

While the variety of ESG standards and frameworks indicates a growing recognition of the importance of sustainability, it also leads to overlapping requirements and varying criteria. This can create significant reporting burdens for companies in navigating multiple standards to meet the expectations of different stakeholders. It also poses challenges for investors who need to interpret and compare ESG data across different reporting frameworks. Table 5-1 illustrates the complex array of ESG reporting standards and frameworks, with their purpose, scope and key features.

LOGOS OF ESG REPORTING FRAMEWORKS



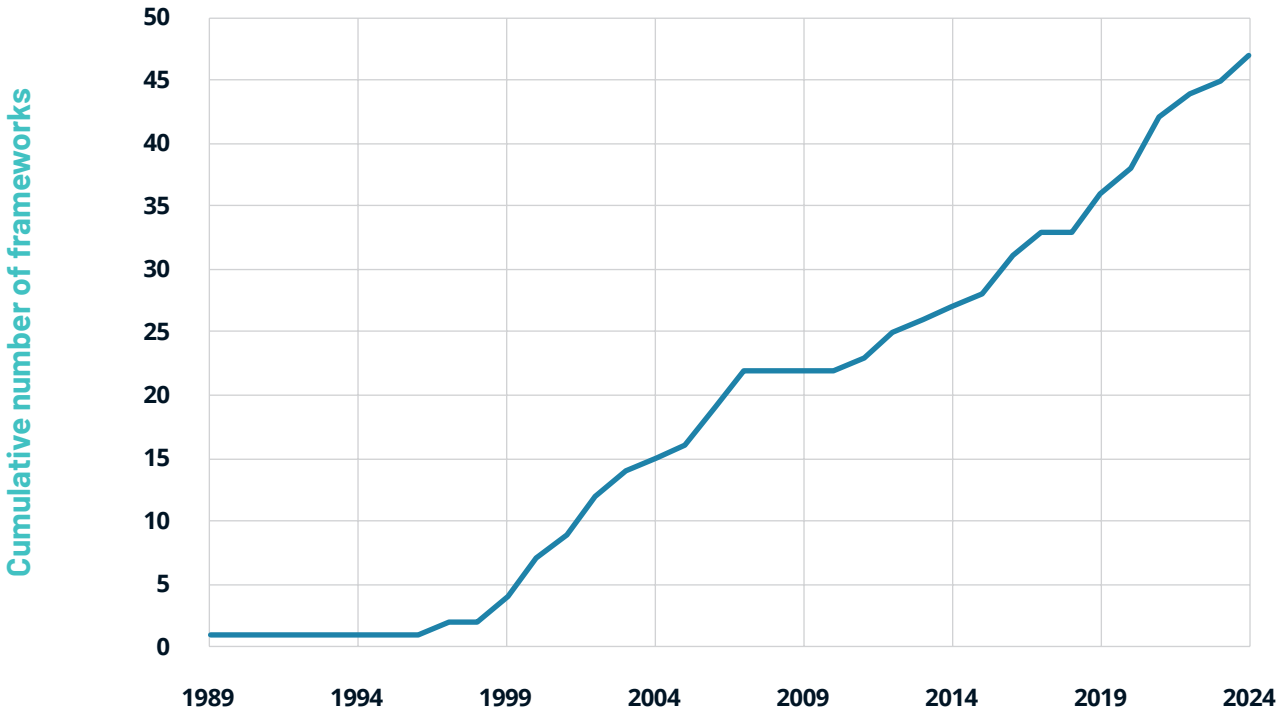
Table 5-1 Summary of ESG Standards and Frameworks

ESG Standard /Framework	Purpose	Scope	Key Features
Global Reporting Initiative (GRI)	Provide guidelines for sustainability reporting	Broad (multi- industry)	Comprehensive guidelines, universal and sector-specific standards, emphasis on stakeholder inclusiveness
Sustainability Accounting Standards Board (SASB)	Provide industry-specific standards for sustainability disclosure	Industry- specific	Focus on financial materiality, decision-useful information for investors, detailed industry-specific metrics
Task Force on Climate- related Financial Disclosures (TCFD)	Provide recommendations for climate-related financial disclosures	Broad (multi- industry)	Framework covering governance, strategy, risk management, and metrics for climate-related risks and opportunities
International Finance Corporation Performance Standards (IFC PS)	Set benchmarks for environmental and social sustainability in projects	Project- specific, applicable to private sector investments in non OECD member states	Eight performance standards covering risk management, labor, resource efficiency, community health, biodiversity, indigenous peoples, and cultural heritage
United Nations Global Compact (UNGC)	Encourage businesses worldwide to adopt sustainable and socially responsible policies	Broad (multi- industry)	Ten principles covering human rights, labor, environment, and anti- corruption, reporting through Communication on Progress (COP)
Principles for Responsible Investment (PRI)	Promote responsible investment practices	Investment industry	Six principles encouraging ESG integration into investment practices, annual reporting and assessment process
Carbon Disclosure Project (CDP)	Provide a global disclosure system for managing environmental impacts	Broad (multi- industry)	Focus on climate change, water security, and deforestation, annual questionnaires, and scoring system
Climate Disclosure Standards Board (CDSB)	Provide a framework for reporting environmental and climate information	Broad (multi- industry)	Framework for integrating environmental information with financial reporting, focus on climate change and natural capital
International Sustainability Standards Board (ISSB)	Develop global sustainability-related disclosure standards	Broad (multi- industry)	Consolidation of existing standards (e.g., GRI, SASB, TCFD) into a single set of guidelines, focus on comparability and reliability
ISO 26000	Provide guidance on social responsibility	Broad (multi- industry)	Seven core subjects including organisational governance, human rights, labor practices, the environment, fair operating practices, consumer issues, and community involvement and development
European Sustainability Reporting Standards (ESRS)	Standardise sustainability reporting across the EU	EU-specific, multi-industry	Detailed guidelines for reporting sustainability impacts, risks, and opportunities, alignment with global frameworks such as GRI, SASB, and TCFD
Global Compact Network (GCN)	Encourage and support businesses to align their operations with universal principles	Broad (multi- industry)	Ten principles related to human rights, labor, environment, and anti- corruption, annual Communication on Progress (COP)
Dow Jones Sustainability Index (DJSI)	Benchmark corporate sustainability performance	Broad (multi- industry)	Assesses companies based on economic, environmental, and social criteria, used by investors to identify sustainable investments
Bloomberg ESG Data Services	Provide ESG data for investment analysis	Broad (multi- industry)	Comprehensive ESG data coverage, used by investors to evaluate corporate performance on ESG criteria
MSCI ESG Ratings	Assess companies' resilience to long-term ESG risks	Broad (multi- industry)	Ratings on a scale from AAA to CCC based on exposure to ESG risks and how well companies manage those risks

Table 5-1 Summary of ESG Standards and Frameworks (cont.)

ESG Standard /Framework	Purpose	Scope	Key Features
Sustainable Development Goals (SDGs)	Achieve a better and more sustainable future	Global, multi- industry	17 goals addressing global challenges, including poverty, inequality, climate change, environmental degradation, peace, and justice
EcoVadis	Provide business sustainability ratings	Broad (multi- industry)	Evaluates companies on environmental, social, and ethical performance, used by supply chain partners to assess sustainability
Ethibel Sustainability Index (ESI)	Promote socially responsible investment	Broad (multi- industry)	Includes companies that perform better than average in their sector on ESG criteria
FTSE4Good Index Series	Measure the performance of companies demonstrating strong ESG practices	Broad (multi- industry)	Criteria based on ESG risk exposure and management practices, used by investors to identify sustainable investments
RobecoSAM Corporate Sustainability Assessment (CSA)	Assess corporate sustainability performance for inclusion in DJSI	Broad (multi- industry)	Detailed assessment of companies' sustainability practices, used for DJSI inclusion
GRESB (Global Real Estate Sustainability Benchmark)	Assess the ESG performance of real assets	Real estate, infrastructure	Annual assessment and scoring of sustainability performance in real estate and infrastructure investments
Vigeo Eiris	Provide ESG research and ratings	Broad (multi- industry)	ESG ratings based on risk and performance criteria, used by investors for decision-making
S&P Global ESG Scores	Assess companies' ESG performance	Broad (multi- industry)	ESG scores based on comprehensive assessment, used by investors for benchmarking and investment decisions
UN Principles for Responsible Banking (PRB)	Align banking sector with SDGs and Paris Climate Agreement	Banking industry	Six principles for responsible banking, annual reporting and self-assessment process

The proliferation of ESG-related reporting frameworks over time



"As of 2024, 22 of the 27 EU member states are also OECD members."

5.3. Challenges in ESG Reporting

Despite the widespread adoption of ESG reporting frameworks, significant challenges persist in ensuring the effectiveness, reliability, and comparability of ESG disclosures. A primary issue is the lack of standardisation across various frameworks, which leads to inconsistencies and complicates the comparison of reports from different companies. This inconsistency undermines the utility of ESG reports for stakeholders, particularly investors who depend on this information to make informed decisions. The divergence in reporting standards presents additional challenges for companies operating across multiple jurisdictions, as they must navigate and comply with differing ESG reporting requirements (Laker, 2023).

Another critical challenge is the risk of "greenwashing", where companies provide misleading or exaggerated information about their environmental or social performance to appear more responsible than they are. Greenwashing often occurs when companies selectively report on positive aspects of their ESG performance while downplaying or omitting negative impacts. This issue is exacerbated by the reliance on self-reported data, which may not be independently verified. Consequently, there is increasing concern about the accuracy and transparency of ESG reports, particularly in sectors like mining where the stakes are high (Corson and Bell, 2022). Moreover, many ESG frameworks, such as those developed by the SASB, focus predominantly on financial materiality. While financial materiality is important, it often fails to capture the full spectrum of environmental and social impacts that a company may have. This narrow focus can lead to significant issues, such as biodiversity loss or community displacement, being overlooked or underreported, thereby diminishing the overall effectiveness of ESG reporting in promoting sustainable development. To address these broader impacts, a more holistic approach to ESG reporting is required – one that considers both financial and nonfinancial materiality (Responsible Mining Foundation, 2023).

Performance standards, while crucial for ensuring accountability and driving improvements in ESG practices, also face challenges. One major criticism is that these standards can be difficult to implement, particularly for smaller companies or those operating in regions with limited regulatory oversight. The complexity and cost of compliance can be prohibitive, potentially discouraging some companies from adopting these standards. Additionally, there is the challenge of inconsistent application and enforcement of performance standards. While the standards themselves provide a clear framework,

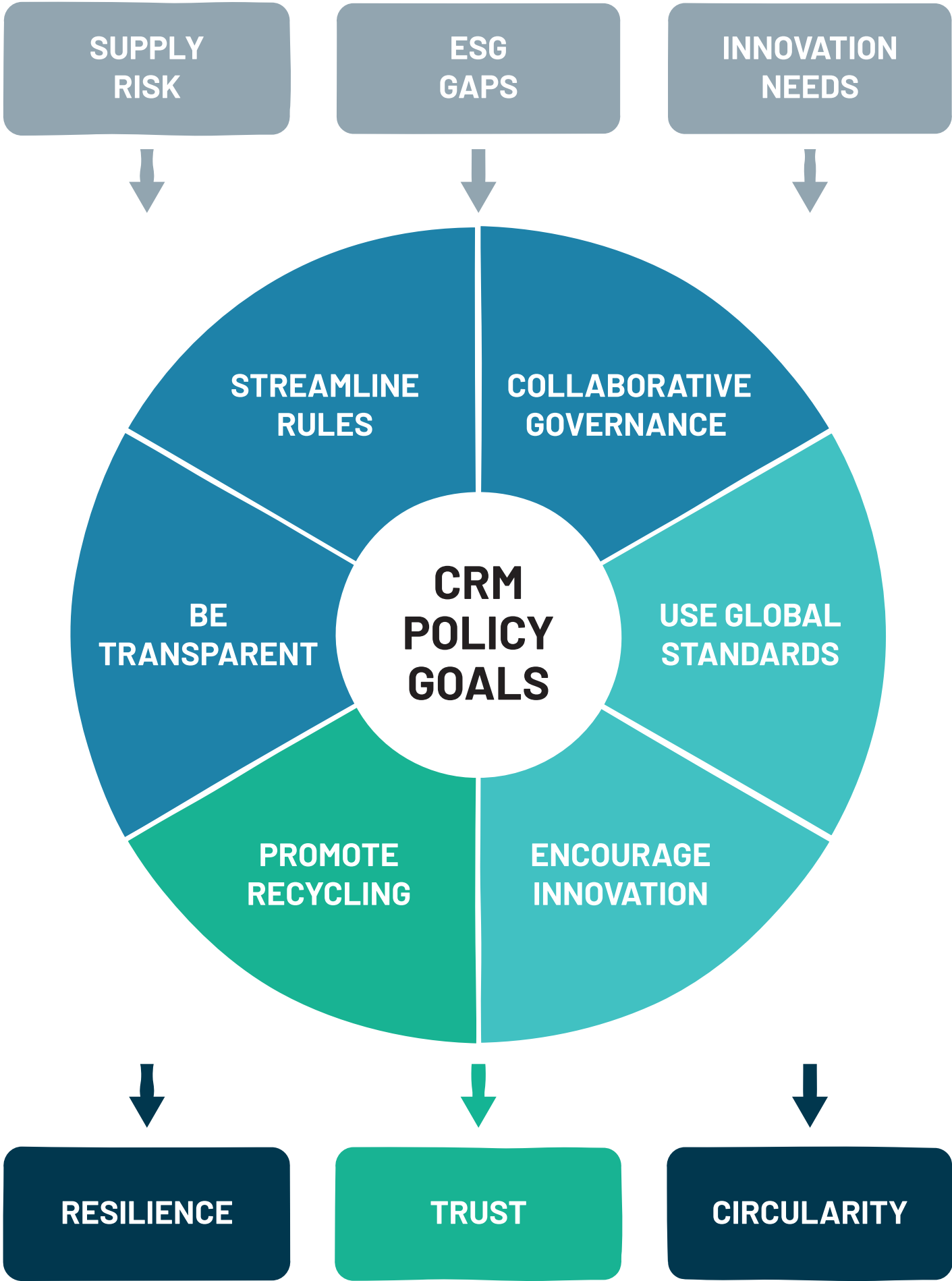
their effectiveness can vary depending on the resources and commitment of the companies involved. This variability can undermine the credibility of performance standards and pose challenges for stakeholders who rely on these standards to assess ESG performance (Fraser, Russill and MacCallum, 2024)

There is also an ongoing debate about the balance between prescriptive standards, which offer detailed requirements, and principles-based standards, which provide more flexibility. While prescriptive standards ensure consistency, they may also limit innovation and adaptability. Conversely, principles-based standards allow for greater flexibility but can lead to varying interpretations and inconsistent applications. Striking the right balance between these approaches is critical to the effectiveness of performance standards.

The categorisation of projects and, by extension, their reporting requirements, often hinges on whether they are located in countries that are members of the Organisation for Economic Cooperation and Development (OECD) or in non-OECD countries. This can significantly impact the level of scrutiny these projects face and the necessity to comply with international frameworks and standards, such as the Equator Principles. Projects in OECD countries are generally assumed to operate within robust regulatory frameworks, strong governance structures, and well-established environmental and social safeguards. In contrast, projects in non-OECD countries typically undergo greater scrutiny due to the perceived variability in governance, regulatory frameworks, and enforcement mechanisms.

As of 2024, 22 of the 27 EU member states are also OECD members. Bulgaria, Croatia, Cyprus, Malta and Romania are not OECD members. The assumption is that the remaining 22 EU states have sufficiently robust policy and regulatory frameworks for environmental and social safeguarding. However, this is not uniformly the case and, importantly, very few EU states have specific regulations for minerals and mining. Notable exceptions include Poland, Germany, Sweden, Finland and Spain; these have established mining sectors and corresponding regulatory frameworks. Most other OECD member countries within the EU rely on broader EU regulatory frameworks, such as the Mine Waste and Water Framework Directives. It is also important to note that there are no comprehensive 'Social Safeguarding' directives or frameworks at the EU level to address these issues specifically (Fraser, Russill and MacCallum, 2024).

SUMMARY OF RECOMMENDATIONS FOR POLICY MAKERS



"Investors are increasingly incorporating ESG factors into their investment decisions, recognising that sustainable companies are more likely to deliver long-term value."

5.4. Harmonisation and Global Integration

For ESG reporting to be truly effective in driving sustainable development, it must transcend mere compliance and become a tool for systemic change. This requires a shift from focusing solely on financial materiality to embracing the concept of double materiality, which considers both the financial implications of sustainability issues and the broader impacts of a company's operations on society and the environment. Integrating double materiality into ESG reporting frameworks is crucial for ensuring that companies address the full range of sustainability challenges and opportunities (Global Reporting Initiative, 2022).

Furthermore, there is a pressing need to place greater emphasis on social factors in ESG reporting. While environmental and governance issues have received significant attention, social issues such as labour rights, community engagement and human rights are often underemphasised. Addressing this gap is essential to ensure that ESG reporting supports a just and equitable transition to a sustainable economy. Companies must be encouraged to provide more detailed and transparent information about their social impacts and the measures they are taking to mitigate negative outcomes (Responsible Mining Foundation, 2023) and create wider benefits.

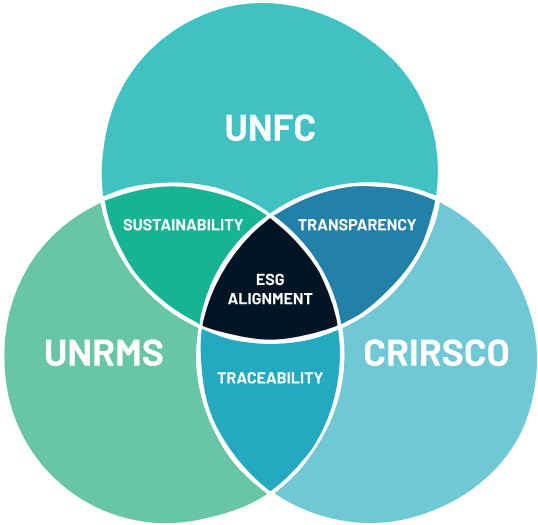
In response to these challenges, efforts to harmonise ESG reporting standards and create more integrated frameworks that can be applied globally have been increasing. The ISSB, established at the 2021 COP26 climate summit, is one such initiative aimed at developing a unified global sustainability reporting framework. The ISSB seeks to align and integrate existing standards, such as the GRI, SASB, and the TCFD, into a single framework that can provide consistent and comparable ESG information across different sectors and regions (Cooley, 2023).

The EU's ESRS have also been designed with harmonisation in mind, aiming to align with global standards while addressing specific regional needs. The ESRS works in conjunction with the CSRD, providing detailed guidelines for how companies should report on sustainability issues. This alignment helps ensure that ESG reporting within the EU is both rigorous and globally relevant, making it easier for stakeholders to assess the sustainability performance of companies. The ESRS also includes provisions for double materiality, requiring companies to consider both the financial impact of sustainability issues on the company and the impact of the company's activities on the environment and society (Ellman, 2024).

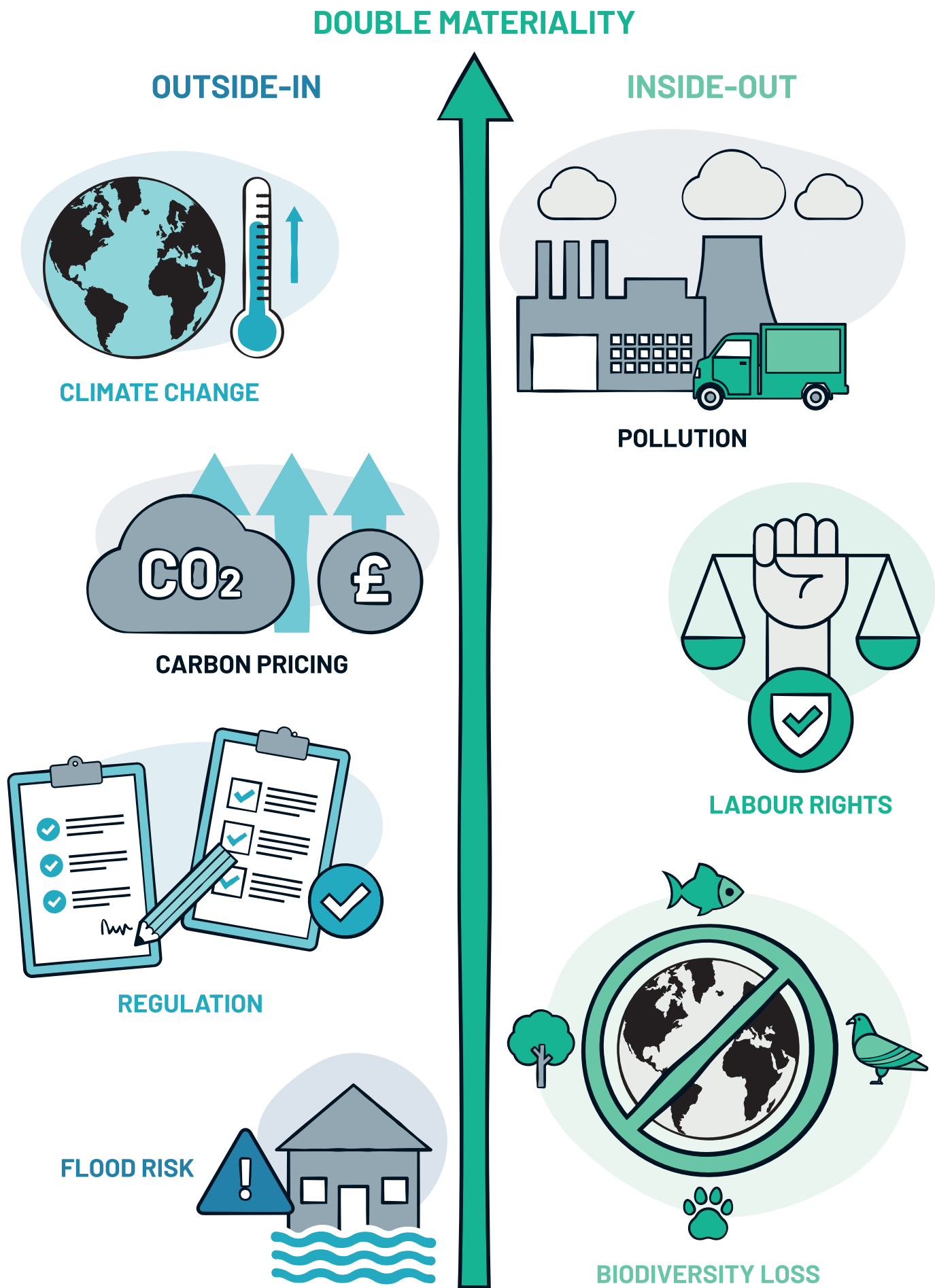
In the mining sector, there has been a concerted effort to create a unified global standard for ESG

reporting. Organisations such as the ICMM, the World Gold Council, and the Mining Association of Canada are collaborating to develop a global standard that would apply to all mining companies. This standard, which would require third-party verification of ESG reports, aims to ensure greater credibility and trustworthiness in the reporting process. By establishing a consistent and transparent reporting framework, the mining industry can better address stakeholder concerns and contribute to sustainable development goals (ICMM, 2023).

Investors are increasingly incorporating ESG factors into their investment decisions, recognising that sustainable companies are more likely to deliver long-term value. Implicit in this is the assumption that good ESG performance and compliance with these codes or systems reduce exposure to social and reputational risks, building future-proof resilience into projects and investments. ESG reporting provides investors with the necessary information to evaluate a company's sustainability performance and make informed investment choices. However, one of the main criticisms of ESG reporting remains the lack of consistency in standards and metrics. Different frameworks and guidelines can lead to inconsistent and incomparable data, making it difficult for stakeholders to evaluate and compare companies' ESG performance. There is also a persistent risk of greenwashing, where companies may present a misleadingly positive picture of their ESG performance without making substantive changes, which can undermine the credibility of ESG reporting and erode stakeholder trust.



DOUBLE MATERIALITY IN ESG REPORTING



6.1. The Critical Raw Materials Act (CRMA)

The CRMA, approved by the European Parliament in September 2023, represents a strategic legislative effort aimed at securing a stable, diversified, and sustainable supply of CRMs to support the EGD. The CRMA seeks to address several key challenges inherent in the CRM sector, particularly those related to ESG. These challenges include the lack of standardisation in ESG frameworks, risks of greenwashing, and the inconsistent application of performance standards across different jurisdictions.

One of the most pressing issues the CRMA seeks to address is the fragmentation in ESG reporting standards. The divergence in these frameworks has led to significant inconsistencies, making it difficult for stakeholders, particularly investors, to accurately assess and compare the sustainability performance of companies. This problem is especially acute in the mining sector, where environmental and social impacts are substantial and where transparency and accountability are critical for building trust with stakeholders (Fraser, Russill and MacCallum, 2024). The CRMA's push for harmonisation and alignment with global standards, such as those set by the ISSB, is vital for reducing this fragmentation. By promoting consistent and comparable ESG reporting across different jurisdictions, the CRMA facilitates better decisionmaking for investors and other stakeholders and has potential to address risks associated with greenwashing and restoring trust in ESG disclosures (Ellmen, 2024).

As described in Section 5, most EU states rely heavily on broader EU directives that do not fully address the unique challenges posed by the mining sector, particularly regarding social safeguarding. This regulatory gap highlights the need for a more comprehensive approach to CRM management within the EU, one that transcends the existing patchwork of national and EU-level regulations. The CRMA aims to fill this gap by establishing a unified approach to managing CRMs, ensuring that sustainability practices are consistent across the EU and that they align with the broader goals of the EGD (European Commission, 2023).

The CRMA also introduces the concept of double materiality – the importance of companies considering not only the financial implications of sustainability issues but also the social and environmental risks posed by their activities. By embedding this concept into the CRMA, the EU is advocating for a more holistic approach to ESG reporting, one that fully accounts for

the sustainability challenges and opportunities in the CRM sector. This approach is necessary to ensure that the extraction and use of CRMs contribute positively to both the economy and society, rather than merely meeting financial benchmarks (Global Reporting Initiative, 2022).

The CRMA also prioritises the diversification of CRM supply sources. This strategic focus aims to reduce the EU's dependency on non-EU countries for CRMs, which is critical for mitigating risks associated with geopolitical tensions, trade restrictions, and supply chain disruptions. The CRMA emphasises the identification and development of domestic CRM resources and establishment of strategic partnerships with resource-rich countries outside the EU. This approach aligns with the recommendations from ERMA to enhance supply chain resilience and secure a stable supply of CRMs essential for the EU's transition to a green and digital economy (Ursache, 2023).

Another significant aspect of the CRMA is its support for R&D initiatives aimed at fostering technological advancements that improve the efficiency and sustainability of CRM supply chains. By encouraging innovation, the CRMA seeks to develop less invasive extraction methods, enhance resource efficiency, and reduce environmental impacts. These advancements are critical for improving the social acceptability of CRM projects among host communities and ensuring that the mining sector contributes positively to sustainable development (European Commission, 2023).

The CRMA also includes provisions for streamlining permitting processes, a response to one of the most significant obstacles facing the CRM sector in Europe. On average, the permitting process for a mining project, in the EU can take anywhere from 5 to 10 years. By reducing the timeframes for extraction permits to 24 months and processing and recycling permits to 12 months, the CRMA aims to address the lengthy and complex permitting procedures that often delay CRM projects. This is also designed to make mineral exploration and extraction in the EU more attractive to potential investors, accelerating the development of critical projects and ensuring a more timely response to the growing demand for CRMs (Mitchell, 2023). However, this emphasis on expedited permitting raises concerns about potentially undermining the scrutiny of ESG issues, particularly if faster permitting is perceived as a way to minimise public and environmental oversight (Proctor, 2021).

While the CRMA represents a significant step forward in ensuring the availability of CRMs necessary for Europe's transition to a green and digital economy, it also faces several critical challenges. The Act acknowledges the importance of ESG reporting as a means to enhance transparency, accountability and sustainability in CRM supply chains but does not explicitly mandate adherence to specific ESG standards such as the GRI, the SASB or the TCFD. Instead, it emphasises the need for comprehensive ESG disclosures without providing detailed guidelines on the metrics and frameworks to be used (European Commission, 2023). This lack of specificity could result in varying levels of ESG performance across the sector, potentially undermining the CRMA's goals of sustainability and transparency. Similarly, the CRMA requires ESG certification for strategic projects, yet does not define the scope of the certification or what certification scheme should be used.

Moreover, the CRMA's provisions for public engagement and responsible practices are somewhat vague, with the responsibility for

ensuring meaningful stakeholder engagement largely devolved to national legislation. This lack of standardised public engagement requirements hinders the CRMA's ability to foster broad social acceptance, a critical factor for the successful implementation of CRM projects. Without clear and enforceable guidelines for stakeholder engagement, the CRMA may struggle to build the necessary trust and support among communities affected by mining activities (Global Witness, 2023).

In conclusion, the CRMA is a significant legislative effort aimed at securing a sustainable and resilient supply of CRMs essential for the EGD, but it has certain gaps that could hinder its effectiveness in promoting responsible and effective mining practices. By consolidating best practice preconditions into a voluntary framework, policymakers and regulators can address these gaps and enhance the CRMA's effectiveness. To truly succeed, the CRMA must ensure that ESG reporting is not only comprehensive and standardised but also that it meaningfully addresses the social and environmental concerns of all stakeholders involved.

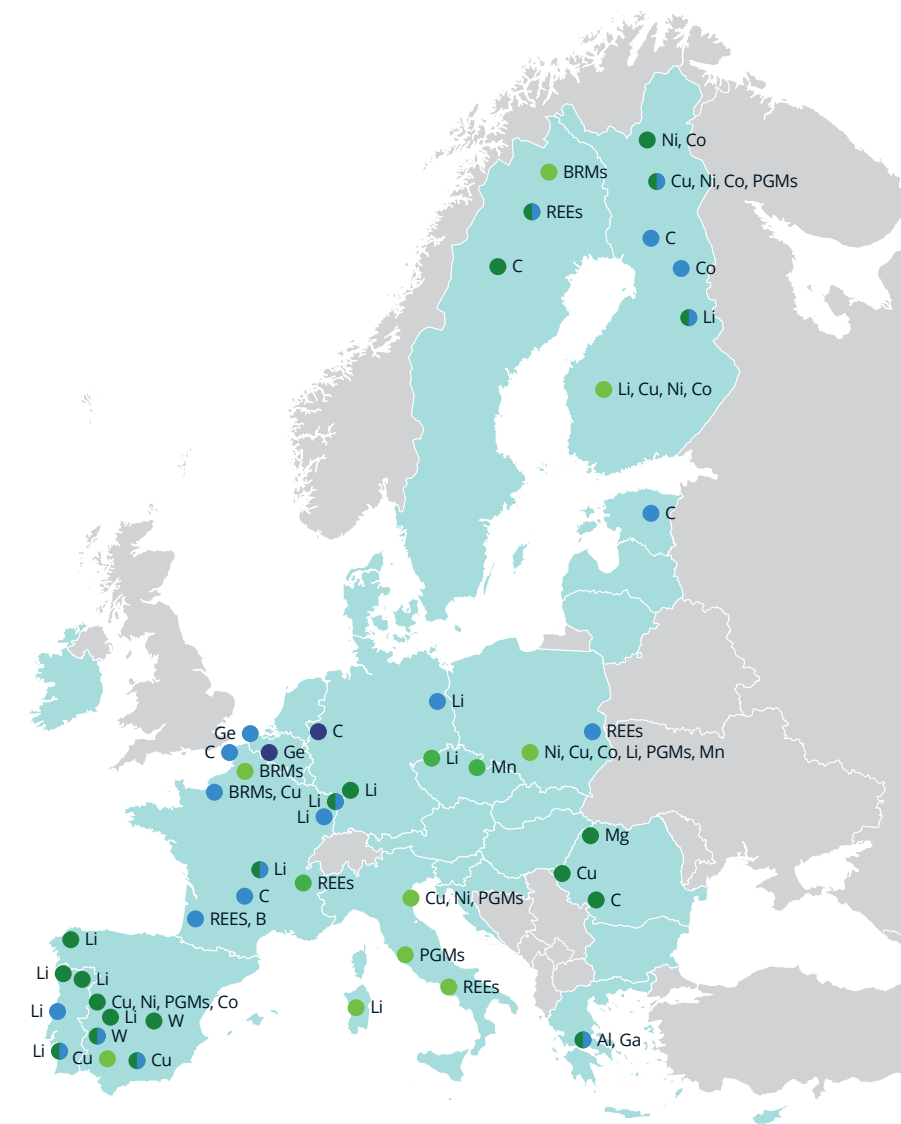
Strategic Projects for the EU

- Extraction
- Processing
- Recycling
- Substitution

Al	Aluminium
B	Boron
BRMs	Battery Raw Materials ¹
Co	Cobalt
Cu	Copper
Ga	Gallium
Ge	Germanium
C	Graphite
Li	Lithium
Mg	Magnesium
Mn	Manganese
Ni	Nickel
PGMs	Platinum Group Metals
REEs	Rare Earth Elements
W	Tungsten

¹ Battery Raw Materials refer to Lithium, Cobalt, Nickel, Manganese and Graphite.

Disclaimer: the location of projects is based on a regional scale and doesn't reflect their exact geographical locations.



6.2. EU Taxonomy

The EU Taxonomy is a comprehensive classification system designed to guide investors, companies, and policymakers in identifying economic activities that contribute to the European Union's environmental and sustainability goals. As part of the EU's broader efforts under the European Green Deal, the Taxonomy plays a crucial role in driving the transition towards a more sustainable economy by setting clear criteria for what constitutes a "sustainable" activity. This framework is particularly significant for the mining sector, which is both an essential component of the EU's industrial base and a sector with substantial environmental and social impacts (European Commission, 2020).

The EU Taxonomy Regulation came into force in July 2020 and establishes a list of environmentally sustainable economic activities based on their contributions to six key environmental objectives:

1. Climate change mitigation;
2. Climate change adaptation;
3. Sustainable use and protection of water and marine resources;
4. Transition to a circular economy;
5. Pollution prevention and control; and
6. Protection and restoration of biodiversity and ecosystems.

For an economic activity to be classified as environmentally sustainable under the EU Taxonomy, it must make a substantial contribution to one or more of these objectives, do no significant harm (DNSH) to any of the other objectives, and comply with minimum safeguards such as human rights and labour standards. However, one notable omission is the absence of a dedicated taxonomy for the mining sector.

Mining is at the heart of the EU's green transition, providing the raw materials necessary for renewable energy technologies, electric vehicles and digital infrastructure. The EU has recognised the strategic importance CRMs through initiatives like the CRMA yet, without a dedicated taxonomy, the mining sector lacks clear guidance on what constitutes sustainable practices specific to its operations. This is a critical gap in the EU's

sustainability framework, potentially undermining efforts to transition to a green economy, because the environmental and social impacts of mining can be profound, including habitat destruction, water pollution, and greenhouse gas emissions (European Commission, 2021). A dedicated taxonomy for mining would provide the sector with specific criteria to meet the EU's sustainability objectives, ensuring that the extraction and processing of CRMs align with the broader goals of the EGD.

One possible reason for the absence of an EU taxonomy for mining is the complexity of defining sustainable mining practices. Mining activities vary widely depending on the type of mineral extracted, the geographical location and the methods used. This diversity makes it challenging to develop "one-size-fits-all" criteria that accurately capture the sustainability of mining operations. Moreover, sustainable mining (if, indeed, mining can ever be considered sustainable) is not just about minimising environmental impacts but also involves complex social and governance considerations. Developing a comprehensive taxonomy that addresses all these dimensions would require extensive consultation and collaboration across multiple stakeholders, which may explain the delay or hesitance in creating a mining-specific taxonomy.

The absence of a dedicated taxonomy also increases the potential for greenwashing which is particularly concerning in the context of mining. Furthermore, it may lead to inconsistencies in how mining companies report and manage their sustainability impacts. Different companies might interpret general sustainability criteria differently, leading to a fragmented approach that undermines the EU's broader sustainability goals.

The EU has the opportunity to set a global standard for sustainable mining practices through a dedicated taxonomy. By clearly defining what sustainable mining looks like, the EU could encourage innovation in extraction technologies, resource efficiency, and environmental management. This would not only improve the sustainability of the mining sector within the EU but could also influence global standards, given the EU's leadership in environmental policy.

7

FROM DISCOVERY TO MARKET: RECOMMENDATIONS FOR POLICY MAKERS AND REGULATORS

The journey from the discovery of CRM deposits to their market availability is complex and involves a delicate balance of geological, technical, environmental, and socio-political factors. Ensuring that this process is efficient, sustainable, and socially acceptable is crucial for the EU as it strives to meet the ambitious goals of the EGD. Based on insights from the CRMA and related Horizon 2020 and Horizon Europe research initiatives, several key recommendations emerge for policy makers and regulators.

7.1. Develop a Dedicated EU Taxonomy for Mining

A critical first step in enhancing the sustainability of CRM projects is the development of a dedicated EU taxonomy for mining. This must provide clear, sector-specific criteria for what constitutes sustainable mining practices, encompassing environmental impact, resource efficiency, social responsibility and governance. A mining-specific

taxonomy would help ensure that CRM projects align with the EU's broader sustainability goals, providing clarity for companies and investors alike. It would also standardise sustainability expectations across the sector, reducing the risk of greenwashing and enhancing the credibility of ESG efforts.

7.2. United Nations Resource Management System (UNRMS)

One of the most significant barriers to CRM development in the EU is the cumbersome and lengthy permitting process. The CRMA's ambitious initiative to shorten permitting timelines for CRM projects to 24 months for extraction permits and 12 months for processing and recycling reflects a commitment to expediting CRM projects. However, it is essential that these streamlined processes do not compromise the thoroughness of environmental and social impact assessments (ESIAs). The integrity of these assessments is crucial for maintaining public trust and ensuring that CRM projects are sustainable and socially acceptable in the long term (European Commission, 2023; Mitchell, 2023).

To further enhance regulatory efficiency, regulators should adopt a more integrated approach, coordinating across different levels of government and with stakeholders to reduce overlapping regulations that can cause delays. This could involve creating "one-stop-shop" frameworks where all necessary permits and assessments are handled through a single, cohesive process, enhancing efficiency without sacrificing due diligence. Such an approach would ensure that the acceleration of permitting processes does not lead to reduced scrutiny, which could exacerbate public distrust and opposition to mining projects (Ursache, 2023).

7.3.

Enhancing Stakeholder Engagement through Collaborative Governance

Collaborative governance is critical to the success of CRM projects, yet it remains one of the most challenging aspects for mining companies. The CRMA recognises the need for “meaningful engagement” but leaves implementation to national legislation, which varies significantly across the EU. This term is used in place of stakeholder engagement to reflect a more inclusive, trust-based model of shared decision-making. Policymakers should define clear, standardised requirements for collaborative governance that go beyond oneoff consultation. This could include mechanisms for ongoing dialogue throughout the life of a project, ensuring that community concerns are addressed not just during the permitting phase but continuously as the project develops (Proctor, 2021; ICMM, 2023).

Gaining social acceptance requires more than just meeting legal requirements; it involves building trust, demonstrating the benefits of mining projects to local communities and identifying opportunities for creating shared value. Transparent communication, community benefit agreements and ensuring that local populations have a significant role in how projects are developed and managed are crucial. Social impact assessments (SIAs) should be mandatory and include metrics for measuring community well-being and satisfaction, not just economic or environmental impacts. Companies must be held accountable for their social and environmental impacts through regular reporting and independent audits (Global Witness, 2023).

7.4.

Aligning with International Standards for Sustainable Resource Management

The CRMA and related EU initiatives must be aligned with international standards and best practices, such as the UNFC and the UNRMS. These frameworks provide comprehensive guidelines for managing resources sustainably and responsibly, emphasising the importance of ESG considerations (UNECE, 2021).

Regulators should encourage or require companies to adopt these international standards as part of their operational protocols.

This could involve integrating UNFC and UNRMS principles into national legislation or providing incentives for companies that demonstrate alignment with these frameworks. Doing so would not only enhance the sustainability of CRM projects but also improve their credibility on the global stage, ensuring that the EU's CRM efforts contribute positively to global sustainability goals (UNFC_UNRMS Report, 2024).

7.5.

Fostering Innovation and Embracing Circular Economy Principles

Innovation is crucial for overcoming technical and environmental challenges associated with CRM extraction and processing. The CRMA emphasises the need for R&D to advance less invasive extraction methods, improve resource efficiency and reduce environmental impacts. Policy makers should support these efforts by funding R&D initiatives and facilitating collaboration between industry, academia, and government bodies (Fraser, Russill and MacCallum, 2024).

In addition, embracing circular economy principles such as recycling, reusing, and recovering CRMs from waste can significantly reduce the environmental footprint of CRM projects, and potentially create additional value. The CRMA's provisions for promoting circular economy practices should be expanded, with regulators setting clear targets for recycling rates and incentivising companies to develop technologies that enable the recovery of CRMs from secondary sources (UNECE, 2018).

7.6.

Developing a Social Framework for Transparency, Trust, and Accountability

To further enhance transparency, trust, and accountability in CRM projects, there is a pressing need to develop a robust social framework. This framework should be designed to ensure that all stakeholders,

particularly local communities, are actively engaged in and benefit from CRM projects. The following components should be integral to it (Table 7-1):

Table 7-1 Proposed components of a Social Framework

Inclusive Decision-Making	Local communities should have a voice in decision-making processes related to CRM projects. This can be facilitated through the establishment of community advisory boards which would provide a platform for ongoing dialogue between communities, companies and regulators. These boards would play a crucial role in monitoring project impacts and ensuring that community concerns are addressed promptly and effectively (Global Witness, 2023).
Transparency in Reporting of Technical Studies	Companies should be required to publish detailed, project-specific reports on their social and environmental performance, including the outcomes of ESIA's and the measures taken to mitigate negative impacts. These reports should be accessible to the public and subject to independent verification. This transparency will help build trust and demonstrate a genuine commitment to responsible business practices (GRI, 2022).
Benefit Sharing Mechanisms	Shared value is a benefit-sharing approach that focuses on creating economic value in a way that also produces value for society by addressing its needs and challenges. In the context of mining and CRM projects, shared value involves collaboration between companies, governments and local communities to ensure that the benefits of resource development are equitably distributed and aligned to local development priorities. Such mechanisms not only contribute to local economic development but also foster long-term support for CRM projects (ICMM, 2023).
Grievance Mechanisms	A transparent and accessible grievance mechanism should be established to allow communities and other stakeholders to raise concerns about CRM projects. This mechanism should be independent and capable of addressing grievances in a timely and fair manner. It would serve as a critical tool for resolving conflicts and maintaining social license to operate (Proctor, 2021).
ESG Reporting	Transparency in ESG reporting is fundamental to building trust and ensuring accountability in CRM projects. The CRMA calls for comprehensive ESG disclosures; regulators should establish robust mechanisms for monitoring compliance with ESG standards, including regular audits and public disclosure of results. These measures would help build public trust in CRM projects, enabling them to contribute positively to both the economy and the environment (Global Witness, 2023; UNECE, 2021).

The "Critical Raw Materials Guidance for Policy Makers and Regulators" is an essential resource for navigating the complex landscape of CRM management within the European Union. As the EU works towards the ambitious objectives of the European Green Deal, ensuring a sustainable, resilient and socially responsible supply of CRMs is paramount. This guidance addresses the diverse challenges and opportunities that CRM projects present, emphasising the importance of regulatory processes, stakeholder engagement, innovation and alignment with international standards.

The journey from the discovery of CRMs to their availability in the market requires coordinated efforts across various levels of governance, industry and civil society. The recommendations in this guidance aim to ensure that CRM projects are not only economically viable but also fully aligned with the EU's broader sustainability goals. Key steps in this journey include streamlining regulatory processes, enhancing transparency and accountability, and fostering social acceptance.

The integration of double materiality into CRM management highlights the EU's commitment to considering both the financial and societal impacts of mining activities. This approach ensures that CRM development contributes positively to environmental stewardship and social wellbeing, while also supporting economic growth.

As the EU continues to implement the Critical Raw Materials Act and related initiatives, it is crucial for policy makers and regulators to remain vigilant in addressing emerging challenges and adapting to new developments in the sector. Furthermore, while the CRMA is a significant legislative advancement, it has several shortcomings that could hinder its effectiveness; these include unclear guidance with respect to ESG reporting frameworks, public engagement and ESG certification. By embracing

the principles and recommendations outlined in this guidance document, the EU can secure a sustainable future for its critical industries, ensuring that the transition to a green and digital economy is both just and effective.

The time for decisive action is now. The choices made today will shape the future of CRM management in Europe, determining the continent's ability to lead in sustainability, innovation, and economic resilience. Through collective efforts and a commitment to responsible governance, the EU can establish a global standard for the sustainable management of critical raw materials, paving the way for a more sustainable and prosperous future.

The successful development of CRM projects in the EU necessitates a comprehensive and holistic approach that integrates regulatory efficiency, stakeholder engagement, international best practices, innovation and a robust social framework. By adopting these recommendations, policy makers and regulators can ensure that the EU's CRM projects meet the growing demand for critical materials in a manner that is sustainable, socially acceptable, and aligned with the broader goals of the European Green Deal. While the CRMA provides a framework for this transformation, its success ultimately depends on the actions taken today by those in positions of power.

"The time for decisive action is now. The choices made today will shape the future of CRM management in Europe..."

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10	GLOSSARY
CDP	Carbon Disclosure Project
CDSB	Climate Disclosure Standards Board
CRIRSCO	Committee for Mineral Reserves International Reporting Standards
CRMA	Critical Raw Materials Act
CRMs	Critical Raw Materials
CSR	Corporate Social Responsibility
CSRD	Corporate Sustainability Reporting Directive
DJSI	Dow Jones Sustainability Index
EGD	European Green Deal
EIA	Environmental Impact Assessment
ERMA	European Raw Materials Alliance
ESG	Environmental, Social and Governance
ESI	Ethibel Sustainability Index
ESIA	Environmental and Social Impact Assessment
ESRS	European Sustainability Reporting Standards
EVs	Electric Vehicles
GCN	Global Compact Network
GRESB	Global Real Estate Sustainability Benchmark
GRI	Global Reporting Initiative
ICMM	International Council on Mining and Metals
IFC	International Finance Corporation
IFC PS	International Finance Corporation Performance Standards
INFACT	Innovative, Non-invasive and Fully Acceptable Exploration Technologies
ISSB	International Sustainability Standards Board
MINLAND	Integrating Mineral Resource Planning
OECD	Organisation for Economic Co-operation and Development
PRI	Principles for Responsible Investment
R&D	Research and Development
REE	Rare Earth Elements
SASB	Sustainability Accounting Standards Board
SDGs	Sustainable Development Goals
SIA	Social Impact Assessment
SRMs	Strategic Raw Materials
STRADE	Strategic Dialogue on Sustainable Raw Materials
TCFD	Task Force on Climate-related Financial Disclosures
UNFC	United Nations Framework Classification
UNGC	United Nations Global Compact
UNRMS	United Nations Resource Management System

